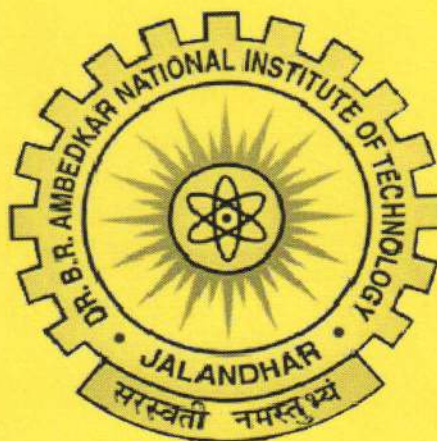


Proposal
for
Technical Education Quality Improvement
Programme (PHASE II)



April 2015

Submitted By
DR B R AMBEDKAR NATIONAL INSTITUTE of
TECHNOLOGY, JALANDHAR - 144011

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As approved by the Chairman BoG through e-mail
dated 29.5.15 (copy enclosed)

21/06/15

Copy to Meeting Section (through Registrar) for
intimation to BoG.

✓ TEQIP- Coordinator



TEQIP teqip <teqip@nitj.ac.in>

VERY URGENT: Revised TEQIP IDP to be submitted to NPIU - draft for approval and Chairman's consent

Joseph Anand Vaz <anandvaz@nitj.ac.in> Sat, May 30, 2015 at 9:46 PM
To: "I.K.Bhat" <ikbhat@rediffmail.com>, ikbhat@nitj.ac.in, director@nitj.ac.in
Cc: agnihotriak@nitj.ac.in, coordinatorteqip@nitj.ac.in, Registrar registrar <registrar@nitj.ac.in>, TEQIP teqip <teqip@nitj.ac.in>

Respected Sir,

Thanks for your prompt action and firm support.
We are now in a position to update our TEQIP performance indicators to NPIU, and proceed with various TEQIP activities under the approved revised IDP.
Best regards

Anand Vaz

Dr. Joseph Anand VAZ
Professor, Department of Mechanical Engineering
Dr. B. R. Ambedkar National Institute of Technology
G. T. Road Bye Pass, Jalandhar
Punjab 144 011, India
Tel: +91-181-2690301 ext. 3104; Fax: +91-181-2690320;
Email: anandvaz@ieee.org, anandvaz@nitj.ac.in

On Sat, May 30, 2015 at 3:19 PM, I.K.Bhat <ikbhat@rediffmail.com> wrote:

With Regards

I K Bhat
Director,
Malaviya National Institute of Technology
Jaipur, Rajasthan, - 302017

From: Rajiv Mehrotra <rm@shyam.co.in>
Sent: Fri, 29 May 2015 14:42:03
To: I.K.Bhat <ikbhat@rediffmail.com>
Subject: Fw: VERY URGENT: Revised TEQIP IDP to be submitted to NPIU - draft for approval and Chairman's consent
Dear Mr. Bhat,

As advised by you, I am approving this IDP. Kindly speed up the process of work so that we achieve the targeted date of completion.

Kindly proceed.

Thanks,
Rajiv Mehrotra
Chairman

From: "I.K.Bhat" <ikbhat@rediffmail.com>
Date: Friday, May 29, 2015 at 11:28 AM
To: Rajiv Mehrotra <rm@shyam.co.in>

*Pl attach this copy
with IDP for
record*

01/06/15

1. INSTITUTIONAL BASIC INFORMATION

1.1 Institutional Identity:

- Name of the Institution : Dr B R Ambedkar National Institute of Technology, Jalandhar – 144011, (Punjab)
- Is the Institution AICTE approved? : Yes
- Furnish AICTE approval no. : F.No. 765-65-206(E)/ET/95 dated 05/06/2006
- Type of Institution : Establish through an Act of Parliament (NIT Act 2007) under MHRD, New Delhi
- Status of Institution : Deemed University (Centrally Funded Institutes of National Importance)

Names of Heads of Institution and Project Nodal Officers

Name	Designation	Email-id	Mobile No.
Professor I K Bhat	Director, NIT Jalandhar	director@nitj.ac.in	9414076013
Prof Joseph AnandVaz	Coordinator TEQIP-II	coordinator@nitj.ac.in	9779030110
Sh. Ajit Singh	Registrar / Nodal Officer (Finance)	registrar@nitj.ac.in	9417525160
Dr Pramod Kumar	Nodal Officer (Academic)	kushwahapramod@nitj.ac.in	9465242268
Dr D K Shukla	Nodal Officer (Procurement)	shukladk@nitj.ac.in	9478128407
Dr Rizwan Ahmad Khan	Nodal Officer (Civil Works and Environment)	khanar@nitj.ac.in	9876497242
Dr Jagwinder Singh	Nodal Officer (Equity Action Plan)	singhj@nitj.ac.in	9501103708
Sh Rajeev Trehan	Nodal Officer (Industry Institute Interaction Activities)	trehanr@nitj.ac.in	8146500951

Phone Number : 0181-2690301, 2690453 (EPABX)
Fax Number : 0181-2690320, 2690932

1.2 Academic Information

• Engineering programmes offered in Academic year 2014-2015

S.No	Titles of programmes	Level	Duration (Years)	Year of Starting	AICTE Sanctioned annual intake	Total Student Strength
1	B.Tech Biotechnology	UG	04	2007	46	36
2	B.Tech Civil Engineering	UG	04	1990	93	91
3	B.Tech Chemical Engineering	UG	04	1990	92	88
4	B.Tech Computer Science and Engineering	UG	04	1990	93	93
5	B.Tech Electronics and Communication Engg	UG	04	1989	93	82
6	B.Tech Instrumentation and Control Engg	UG	04	1990	93	89
7	B.Tech Industrial & Production Engineering	UG	04	1989	92	88
8	B.Tech Mechanical Engineering	UG	04	1990	92	90
9	B.Tech Textile Technology	UG	04	1989	92	79
10	B.Tech Mining Engineering	UG	04	2013	30	27
11	B.Tech Information Technology	UG	04	2013	30	29
12	B.Tech Electrical Engineering	UG	04	2013	30	27
13	M.Tech Chemical Engineering	PG	02	2006	28	22
14	M.Tech Computer Science and Engineering	PG	02	2006	28	24
15	M.Tech Structural and Construction Engineering	PG	02	2004	28	27
16	M.Tech Electronics and Communication Engineering	PG	02	2006	28	28
17	M.Tech VLSI	PG	02	2009	10	09
18	M.Tech Instrumentation and Control Engineering	PG	02	2006	28	26
19	M.Tech Manufacturing Technology	PG	02	2006	28	25
20	M.Tech Mechanical Engineering	PG	02	2006	28	26
21	M.Tech Textile Engineering and Management	PG	02	2004	28	22
22	M.Tech Information Security	PG	02	2013	10	09
23	M.SC (Physics)	PG	02	2006	31	20
24	M.SC (Chemistry)	PG	02	2006	31	23
25	M.SC (Mathematics)	PG	02	2007	31	-
26	PhD Civil Engineering	PhD	03	2006	-	02
27	PhD Control & Instrumentation Engineering	PhD	03	2006	-	04
28	PhD Computer Science and Engineering	PhD	03	2006	-	05
29	PhD Industrial and Production Engineering	PhD	03	2006	-	04
30	PhD Textile Technology	PhD	03	2006	-	04
31	PhD Chemical Engineering	PhD	04	2006	-	04
32	PhD Biotechnology	PhD	03	2008	-	-
33	PhD Electronics and Communication	PhD	03	2006	-	03

	Engineering					
34	PhD Mechanical Engineering	PhD	03	2006	-	06
35	PhD Chemistry	PhD	03	2006	-	02
36	PhD Physics	PhD	03	2006	-	01
37	PhD Mathematics	PhD	03	2006	-	02

• **Accreditation Status of UG programmes:**

Title of UG Programme being offered	Whether eligible for Accreditation or Not	Whether accredited as on 31.03.2015	Whether "applied for" as on 31.03.2015
B.Tech Biotechnology	Yes	No	No
B.Tech Civil Engineering	Yes	No	No
B.Tech Chemical Engineering	Yes	No	No
B.Tech Computer Science and Engineering	Yes	No	No
B.Tech Electronics and Communication Engg	Yes	No	No
B.Tech Instrumentation and Control Engg	Yes	No	No
B.Tech Industrial & Production Engineering	Yes	No	No
B.Tech Mechanical Engineering	Yes	No	No
B.Tech Textile Technology	NA	NA	NA
B.Tech Mining Engineering	NA	NA	NA
B.Tech Information Technology	NA	NA	NA
B.Tech Electrical Engineering	NA	NA	NA

• **Accreditation Status of PG programmes:**

Title of PG Programme being offered	Whether eligible for Accreditation or Not	Whether accredited as on 31.03.2015	Whether "applied for" as on 31.03.2015
M.Tech Chemical Engineering	Yes	No	Yes
M.Tech Computer Science and Engineering	Yes	No	No
M.Tech Structural and Construction Engineering	Yes	No	No
M.Tech Electronics and Communication Engineering	Yes	No	Yes
M.Tech VLSI	Yes	No	Yes
M.Tech Instrumentation and Control Engineering	Yes	No	Yes
M.Tech Manufacturing Technology	Yes	No	No
M.Tech Mechanical Engineering	Yes	No	Yes
M.Tech Textile Engineering and Management	No	NA	NA
M.Tech Information Security	NA	NA	NA
M.SC (Physics)	NA	NA	NA
M.SC (Chemistry)	NA	NA	NA
M.SC (Mathematics)	NA	NA	NA

1.3 Faculty Status (Regular/On-Contract Faculty as on March 31st, 2015)

Faculty Rank	No. of Sanctioned Regular Posts	Present Status : Number in Position by Highest Qualification												Total Number of regular faculty in Position	Total Vacancies	Total Number of contract faculty in Position
		Doctoral Degree				Masters Degree				Bachelor Degree						
		Engineering Discipline		Other Disciplines		Engineering Disciplines		Other Disciplines		Engineering Disciplines		Other Disciplines				
R	C	R	C	R	C	R	C	R	C	R	C	R	C			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Prof	41	18	-	06	-	-	-	-	-	-	-	-	-	24	17	-
Assoc Prof	82	28	-	11	-	18	-	02	-	-	-	-	-	59	23	-
Asst Prof	165	13	05	10	06	09	89	-	21	01	-	-	-	33	132	121
Lec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	288	59	05	27	06	27	89	02	21	01	-	-	-	116	172	-

Prof = Professor, Asso Prof = Associate Professor, Asst Prof = Assistant Professor, Lec=Lecturer, R=Regular, C=Contract.

$$15 = (3+5+7+9+11+13);$$

$$16 = (2-15);$$

$$17 = (4+6+8+10+ 12+14).$$

1.4 Baseline Data(all data given for the following parameters must be restricted to engineering disciplines/fields only)

S.No	Parameters	
1	Total strength of students in all programmes and all years of study in the year 2014-2015 (B.Tech, M.Tech, PhD, MBA&M.Sc)	3782
2	Total women students in all programmes and all years of study in the year 2014-2015	759
3	Total SC students in all programmes and all years of study in the year 2014-2015	572
4	Total ST students in all programmes and all years of study in the year 2014-2015	237
5	Total OBC students in all programmes and all years of study in the year 2014-2015	1014
6	Number of computers procured (Cumulative)	1239
7	Total number of text books and reference books available in library for UG and PG students (Volumes)	1,11,230
8	% of UG students placed through campus interviews in the year 2014-2015	80%
9	% of PG students placed through campus interviews in the year 2014-2015	20%
10	% of high quality under Graduates (>75% marks) in the year 2014-2015	20.80%
11	% of high quality postgraduates (>75% marks) in the year 2014-2015	28.22%
12	Number of research publications in Indian refereed journals in the year 2014-2015	24
13	Number of research publications in International refereed journals in the year 2014-2015	75
14	Number of patents obtained in the year 2014-2015	01
15	Number of patents filed in the year 2014-2015	02
16	Number of sponsored research projects completed in the year 2014-2015	02
17	The transition rate of students in percentage from 1st year to 2nd year in the year 2014-2015 for	
	(i) all students (UG)	71.18
	(ii) SC	42.27
	(iii) ST	50.90
	(iv) OBC	61.57
18	IRG from students fee and other charges in the year 2014-2015 (Rs. in lakh)	1926.79
19	IRG from externally funded R&D projects, Consultancies in the year 2014-2015 (Rs. in lakh)	5.74
20	Total IRG in the year 2014-2015 (Rs. in lakh)	1932.54
21	Total annual recurring expenditure of the applicant entity in the year 2014-2015 (Rs. in lakh)	4204.46
22	Number of Joint publications with National authors in the year 2014-2015	52
23	Number of Joint publications with International authors in the year 2014-2015	-
24	Number of R&D products commercialized in the year 2014-2015	01
25	Number of joint MTech programmes with institutions undertaken in the year 2014-2015	-
26	Number of joint MTech programmes with Industry undertaken in the year	Nil
27	Number of joint PhD with institutions undertaken in the year 2014-2015	-
28	Number of joint PhD with Industry undertaken in the year 2014-2015	Nil
29	Number of joint consultancies undertaken with institutions in the year 2014-2015	-
30	Number of joint consultancies undertaken with Industry in the year 2014-2015	-

1.5 Institutions to be eligible for participation in the Project under the Sub-component 1.2 must fulfil the following benchmarks:

1.6
Benchmarks for Institutions to Qualify for Sub-component-1.2

S.No	Attainment Parameters	Benchmark Values	Institution's response (Yes / No)
1.	Does the institution agree to implement all academic and non- academic reforms given as below:	Yes	Yes
	• Implementation of curricular reforms	Yes	Yes
	• Exercise of autonomies	Yes	Yes
	• Establishment of Corpus Fund, Faculty Development Fund, Equipment Replacement Fund and Maintenance Fund	Yes	Yes
	• Generation, retention and utilization of revenue generated through variety of activities	Yes	Yes
	• Institutions to fill-up all existing teaching and staff vacancies	Yes	Yes
	• Delegation of decision making powers to senior functionaries with accountability	Yes	Yes
	• Improve student performance evaluation	Yes	Yes
	• Improvement performance appraisal of faculty by students	Yes	Yes
	• Provide faculty incentive for Continuing Education (CE), consultancy and R&D	Yes	Yes
	• Obtaining accreditation	Yes	Yes
2.	Availability of academic autonomy as recognized by UGC for both UG and PG programmes	Yes	Yes
3.	Presence of Board of Governors with an eminent academican or industrialist as the Chairperson	Yes	Yes
4.	Percentage of eligible UG programmes accredited or applied for	60 %	In Process
5.	Percentage of eligible PG programmes accredited or applied for	40 %	66.6% (Applied)
6.	Cumulative number of PhDs produced in the last three academic years	5	Yes
	Or Cumulative number of M.Tech produced in the last three academic years (2010 - 105, 2011 – 110 & 2012 - 180)	50	395
7.	Faculty positions filled on regular full time basis as percentage of total faculty positions sanctioned in accordance with the AICTE prescribed student to faculty ratio	65%	40.27
8	Percentage of regular faculty with PhD in engineering, Sciences and as percentage of total faculty	15 %	Yes (29.86 %)

INSTITUTIONAL DEVELOPMENT PROPOSAL (IDP)

2.1 Give the executive summary of the IDP.

Dr B R Ambedkar National Institute of Technology, Jalandhar (NITJ) was established in the year 1987 as Regional Engineering College and three Bachelor (B Tech) programmes in Electronics and Communication Engineering, Industrial Engineering and Textile Technology were started in 1989. It has since grown by leaps and bounds and was given the status of National Institute of Technology (Deemed University) by the Government of India on October 17, 2002 under the aegis of Ministry of Human Resource Development (MHRD), New Delhi. Now the Govt. of India has declared the NITJ as "Institute of National Importance" under the act of Parliament (NIT Act 2007).

Presently, NITJ offers 12 B.Tech Programmes, 10 full time M.Tech. Programmes and three M.Sc. programmes (Chemistry, Physics, Mathematics). All the Departments are also offering Ph.D. programmes except Humanities. The total number of students on the roll of the Institute during 2014-2015 is 3782.

NITJ is highly motivated and qualified faculty has good number of publications in reputed international journals comparable to the best institutions in the country. The NITJ has close relationship to the Industry and other institutes of repute. Faculty has earned many projects from various organisations. MOUs have been signed with many industries and institutes of repute. Its student body has a brilliant history of academic achievements and successful industrial placement. A large number of reputed Industrial houses in the country visit the Institution and select the final year students as Engineers/ Management trainees. The highest pay package offered to the students has been Rs. 35 Lacs per annum by M/s. Work Applications.

While these are all very desirable qualities and achievements, of which NITJ is justifiably proud, there are many challenges that NITJ must currently face, which, if not addressed, will hamper its capacity to maintain and diffuse these qualities. Faculty is overloaded due to the many unfilled vacancies. Its facilities are becoming old and need up-gradation, administrative processes are not upto the expectation due to shortage of supporting staff and an MIS or ERP system.

Having analyzed its current status, its internal strengths and weakness, and the threats and opportunities presented to it, NITJ has decided to embark on a vast and ambitious program of Institutional development to allow it to maintain its excellence and expand it in new directions with focus on quality and relevance.

The strategic plan that has emerged from this include scaling up postgraduate programmes and R&D activities. This will make a increase in human resources capable of undertaking focused research and development for the industry and academia. It is identified that in addition to produce good graduate engineers it must strengthen the postgraduate program and R&D activities that offer both the potential of substantial increase in India's share of the global market in certain specially areas as well as a wide application in the small scale and non formal sectors of the economy. So NITJ has decided to re-align its programmes and focus its energies on the development of research and educational excellence in the following areas:

- Centre of Advanced Materials.
- Centre of Information and Communication Technologies
- Centre for Energy studies

To achieve this requires the development of new physical and human capacities and adjustments to the curriculum, both in its technical aspects as well as in its human, management and service

aspects, to create complete professionals capable of high level of technical competence and innovation and a high capacity for responsible and committed social action.

These ambitious outward thrust must be accompanied by a no less ambitious program of internal structural reform and organizational development. If it wishes to rise to the challenge, NITJ must be able to attract high quality students, recruits a large number of qualified faculty to fill its current vacancies, and substantially improve its administrative efficiency and effectiveness.

The objective of the current proposal for funding under TEQIP-II include the following:

1. Increasing the number of students in M.Tech and PhD programme by 40-50%.
2. Focusing research on the selected areas of excellence, this will account for about 30-40% of the Institution's annual output of publications, patents, consultancy, seminars and conferences.
3. Strengthening of existing M.Tech programmes through systematic review curriculum and upgrading of laboratories.
4. Improving the quality of education through faculty and staff development, upgrading library, information processing centre, and hostel facilities.
5. Establishing a partnership with industry through collaborative research, technical support and sharing of facilities.
6. Improving inter NIT network in order to research facilities, increase the contacts through common guidance of PhD scholars and taking up funded R&D projects.
7. Analyzing the special needs of disadvantaged social groups and women and developing formal programs to address them through equity action plan. It include identification of weaknesses in all students and take remedial steps, give under qualified teachers priority in opportunities to upgrade qualifications, make campus physically and socially gender friendly.
8. Establishing efficiently operating structures and procedures for the governance and management of academic, managerial, administrative and financial autonomy, including upgrading of systems for planning and budgeting, information collection and utilization, staff recruitment, training and performance evaluation, procurement maintenance and utilisation of equipment, and public relations and marketing.

2.2 SWOT analysis.

Strengths

- Meritoriously dedicated young profile of faculty which is focused, motivated and strongly committed to realize the vision of the institute. High potential for research and development.
- The institute is in its nascent stages of growth and is eminently positioned for mid-course correction, wherever required, upgrading of learning.
- Good quality of students selected through a national open competitive examination.
- Quick and smooth decisions making processes within well defined norms.
- Commendable track record of scrupulously following academic calendar.
- Strong informal linkages with institutes of National and International repute.
- Being one of the National Institutes of Technology, strong commitment and support from MHRD Government of India.

- Located in a part of the country known for its skill, dynamism, perseverance and economic prosperity.
- A tremendous scope for two way interaction with stake holders.
- Credit transfer facility amongst NITs and networking institutions.
- Excellent placement and career opportunities for UG students.
- Well structured academic calendar.
- Excellent sports and extracurricular infrastructure.
- Member of association of Indian universities.
- Provision of academic audit and participations of students in academic development of Institute.

Weakness

- Inadequate number and skills of supporting technical and non technical staff.
- Poor placement for PG students.
- Limited facility for e-content generation.
- Under exploited potential of Alumni and Industry for development of the Institute.
- Compartmentalization of resources.
- Need for collaborative research opportunities.
- Insufficient space available in terms of classrooms, hostels, tutorial rooms, seminar rooms, department library and laboratories due to increase in strength of the students.
- Shortage of faculty and trained qualified technical staff.
- Limited decentralization of financial powers.
- Lack of pedagogical training needs.
- No provision of block grant.
- Lack of industry sponsored research initiatives and consultancy projects.
- Laboratories at PG level require up-grading in term of equipments.
- Limited remedial measures for students of weaker section of society.
- Non availability of skilled development facilities and QIP centre.

Opportunities.

- Overseas employment and related opportunities have enhanced career avenues.
- Capacity buildings model for use of e-learning multiplier.
- Creation of platform for sharing of ideas and techniques and pooling of resource among peer groups of experts, academicians and research scholars.
- Ample scope for industry institute and development and entrepreneurship in view of recent development in technological development.
- Connectivity and access for long term utilization and making sustained efforts for content generation infrastructure,
- Spreading digital literacy for teachers and web based learning methodology.
- Scope for international collaboration for higher education and research.
- Opportunities also exist for engineering students in research to analyze, design and development
- Knowledge /research hub and incubation centre to identify the need of technologies.
- Development of computer assisted pedagogical techniques.
- Contents delivery through DTH under National Mission on Education through ICT.
- Setting up of virtual labs and e-class rooms and broadband connectivity under NME ICT.
- Interface with knowledge related activities between different research labs, Industries and technical institutes.

- To tie up and coordination with local industries and workshops for entrepreneurship for development of tools, technologies and gap studies.
- Formulation of good and viable projects being funded under DST, FIST, TIFAC and NMEICT,
- Development of tools, solutions and technology which would be available for open access to all learners and students.
- Capacity to develop centre of excellence.
- Capacity to introduce new PG Programmes provided funds are allocated.
- Can take new research initiatives and industry oriented research programmes.
- Opportunities to establish research centre in advanced materials, applications of ICT, M-health systems, robotics and multidisciplinary centres.
- TO organize and attend conferences/ seminars / symposia and short term courses at National and International level.
- Tremendous scope for the Institute library to offer Institutional membership to the Industries of the surrounding areas.
- Involvement of alumni towards helping the Institutes for getting industry sponsored projects.
- Involve and integrate UG students on research and industry oriented projects.
- Capacity to create spearheading groups for getting the EPF modules in implementation in the Institute.

Threats

- Mushroom growth of engineering colleges and large number of passed graduates has affected the employment opportunities
- Difficult to get students to high rank for PG and PhD programmes.
- Availability of better career opportunities in IT sector has posed a serious threat to hard core engineering.
- Obsolescence and irrelevance caused due to rapid change in technology has posed a higher threats resulting in Industrial stagnation and sickness.
- Due to higher growth opportunities in the industrial sectors, brilliant students do not opt for teaching as their career.
- With the amazonisation and googlisation of information readers may have to do little more efforts to establish the authenticity of the digital information available to them.
- Availability of the information on readers desktop may reduce the dependency of library users on the print documents leading to a lot many health hazards.
- Involvement of faculty for Institutional development activities.
- Less support for real life projects on innovative and creative activities.

2.3 State the specific objectives and expected results of your proposal in terms of, "Scaling-up Postgraduate Education and demand-driven Research & Development and Innovation". These objective and results should be linked to the SWOT analysis.

The assessments of current strengths, weakness, opportunities (SWOT) of the institute lead to the identification of the main objectives that will have to pursued during the project period in order to move the institute closer to its vision. The main objectives that have been designed for the development of NITJ over the next 2-3 years are summarized below:

- **Human Resources:** There is scope to attract meritorious high rank graduate students for post graduate programmes and postgraduate students will be encouraged to pursue PhD. Substantial increase enrolment in post graduate and doctorate programme capable of leading the creation of sustainable and cost effective innovations for the industry and society.

- **Excellence:** Establish state of the art laboratory set up in the selected emerging technologies to improve the national economic and social needs. This will also attract collaborators for R&D work and improve IRG of the Institution.
- **Quality:** Creation of complete professionalism through up-gradation of curriculum faculty and staffing, equipments, learning resources and communication systems of the Institute. Good teaching learning process, regular interaction with industries. It consist of multi objective functions and needs support and cooperation from stakeholders like creation of physical infrastructure, qualified committed and dedicated faculty, talented and sincere non teaching staff, talented students, dynamic and relevant curricula and more precisely a well designed protocol and policy framework leading to various autonomies.
- **Equity:** Encourage participation of women and socially disadvantaged groups and the enhanced management of the Institution for more efficient governances.
- **Outreach:** Increased outreach of the institute to the industry and other Institutions through joint collaborations. Part time PG and PhD programmes to in-serve faculty members.

2.4 Provide an action plan for scaling-up enrolment into Masters and Doctoral programmes (include measures to attract qualified students and maintain high quality standards)

The institute will endeavour to attract students to Masters and Doctoral programmes through assistantships as per the prevalent Government of India norms. It is planned to utilize 10-15% of the total Institutional project outlay for giving assistanceship to Masters and Doctoral students. Those receiving assistantships will be required to devote 8-10 hours per week for teaching assignment, Outstanding candidates enrolled for PhD in selected cases, could be sent abroad for paper presentation in conferences, and exposure/ interaction with eminent research laboratories for three months (as a part of the exchange programmes)

- Qualified faculty attraction
- Increase in number of students in M.Tech / PhD programmes and starting of new Programmes in emerging areas.
- Up-gradation of labs and equipments and obsolete learning and training infrastructure.
- Assistantships to non-GATE candidates to double the strengths.
- Scaling up PG education system and demand driven R&D with creativity and innovation and resulting better employability.

2.5 Provide an action plan for improving collaboration with Industry.

- The provisions will be made to make industry's participation in senate and BOS of various departments so that need of the industry can be taken care of and curriculum can be developed accordingly.
- Experts from the industries shall be invited to deliver guest lectures and to impart practical knowledge. There will be regular industrial visits of the students, staff, and faculty. Seminars, Conferences, workshops will be held in collaboration with industries.
- Efforts will be made to undertake joint research projects in the areas of the expertise available at NITJ and the concerned Industries. The projects may be coordinated jointly by faculty members form institution as well as personnel from the industries. The industry shall be made aware regarding the available programs in the NITJ so that in service personnel can improve their qualifications.
- Revenue sharing mechanism will be evolved and implemented to motivate faculty members to increasingly participate in such activities
- Involving faculty and students to undertake real life industry oriented research projects.

- Identifications of gaps in local industries and remedial measures.
- Sponsored research projects funded by the Industries.

2.6 Provide an action plan for:

- **quantitatively increasing and qualitatively improving research by their faculty individually, jointly and collaboratively,**
 - Visits of the faculty to international research labs and institutes for 15-30 days for meaningful interaction and understanding.
 - With the up-gradation of laboratories faculty members will engage in research activities collaborating with Indian and foreign institutes in academic and Research area through MOUs will definitely increase the research quantitatively and qualitatively.
 - Faculty will be encouraged to upgrade themselves with latest technologies through participation in training programme, attend conferences seminars in India and abroad and visit to R&D faculties of other reputed Institutes or research organizations.
 - Introduction of faculty appraisal.
 - Introduction of education reforms.
 - Tabooing potential and power of UG students in research and industry sponsored projects.
 - Creation of digital environment for teaching and learning mechanism that will result more reach and integration.
- **Developing research interest among undergraduate students**
 - Fiscal Incentive to Industry oriented R & D projects would be provided from TEQIP funds for developing research interest among Under Graduate students.
 - Strengthening of M Tech program, establishment of research facilities; industrial collaboration will definitely give an opportunity to undergraduate students to be part of ongoing research and development activities. Students of bachelor level shall be associated with industry oriented/sponsored research programmes under the guidance of faculty members. The work carried out will be submitted for presentation in the national / international conferences and for publication in National / International journals to give a more boost students their abilities to do research work.
 - Financial support to PG and PhD students to undertake and involvement in research activities.
- **Collaborating with Indian and foreign institutions in academic and research area through MOUs**
 - NITJ shall develop long term strategic alliances with Institutions that have R&D faculty initially communication will be set up with academic Institutions, R&D agencies and Industries. Faculty members in small groups will be deputed to verify various prospectus and to sign MOU on viable collaborative projects with specific time frame and well defined outputs. These projects may be coordinated jointly by personnel faculty members from collaborating Institutions.

- A well defined and transparent revenue sharing mechanism shall be evolved and implemented to motivate faculty members to increasingly participate in such activities. The participating Institutions shall share their resources like faculty and staff computer centre major labs workshops equipments and libraries, and engaging experts from these institutions for short term and / or part time basis.
- Presently, NITJ has established an NIICN (National International Institute Collaboration Networking) cell.

2.7 Attach the summary of Training Needs Analysis carried out. Also, provide Faculty Development Plan from the first 18 months to achieve improved competence based on Training Needs Analysis (TNA) in the following areas.

2.8 Provide an action plan for training technical and other staff in functional areas.

2.9 Describe the relevance and coherence of Institutional Development Proposal with State's/National (in case of CFIs) Industrial / Economic Development Plan.

With global demand of having a formal structure in skills and technical education in place, a strong need has been felt by the stake holders to have a where certain pressing issues pertaining to skills and technical educations could be enhanced. Additionally, in the context of vision 2020 and the year to come, India remains the only country to provide the world with largest youth population. Hence, strengthening the skills and higher technical education at the level of PG and PhD is the pressing demand of the country.

2.10 Participation of the Department / Faculty in the proposal preparation and implementation.

All the faculty members of the department have been involved in the preparation of this proposal and are committed to play active role in the project implementation. The faculty members of the department have been actively involved in the preparation and various aspect of the proposal. The areas of research and PG study requiring areas for excellence have been made and elaborated. Coordinators for various areas of research in place. The department committees consisting of faculty members will have periodic monitoring. It is proposed to have interaction session with faculty, Director and Nodal Officer regularly.

2.11 Describe the Institutional Project Implementation arrangements.

The project would be implemented through a team headed by the Director comprising of the following:

- **Project Coordinators (TEQIP):** Overall Coordination of various activities and providing guidance to official under the project. Overseeing the execution and implementation of various activities under the project. Submission of the annual progress reports and audit reports to NPIU. Liaising with the NPIU regarding operation and management of the project. Obtain need based assistance from experts
- **Nodal Officer (Finance) :** The Nodal Officer (Finance) will be responsible for the overall financial management of the project, including the estimation of fund requirement for different purpose, timely disbursement of funds, maintenance of proper accounting and audit, and ensuring timely reconciliation of accounts, monitoring of funds for their proper utilizations and submitting the records periodically and issue statement of expenditure, checking of procurement methods and allocation of resources to various components of the project.

- **Nodal Officer (Academics):** Nodal Officer (Academics) will be responsible for Providing assistanceship for Masters and Doctoral students under the project, Enhancement of R & D activities, modernization and strengthening of libraries and / or access to knowledge source.
- **Nodal Officer (Procurement):** The Nodal Officer (Procurement) will be the nodal point for all the procurement related matters under the projects and will function as the main resource person to guide and advice on procurement procedure as per the World Bank guidelines.
- **Nodal officer (Equity Action Plan):** Nodal officer (Equity Action Plan) is responsible to ensure that all students and faculty have equal opportunity to avail the benefits of the project. This includes the preparation of action plan for equity assurance, its implementation and monitoring.
- **Nodal Officer (Industry Institute Interaction Activities):** Nodal Officer (IIIA) will look after the activities related to training and placement of the Institutes. Organize workshops / seminars etc for the students to prepare them for the placements.
- **Nodal Officer (Civil Works and Environment):** Nodal officer (Civil) will look after the activities related to civil works and environment management within the premises of the Institute

Table-34:
Institutional Project Budget for Sub-Component 1.2

S.No	Component / Category	Percentage (%)	Project Life allocation (Amount in Crores)	
A) Procurement of Goods and Minor Civil Works(45%)				
1	Improvement in Teaching, Training and Learning facilities	I. Procurement of Goods	45	5.625
		a. Equipment		
		b. Furniture		
		c. Books and LR&s & Software		
		d. Minor Items		
		II. Refurbishments (Minor Civil Works)		
		III. Consultancy Service		
B) Academic activities (45%)				
2	Providing Teaching and Research Assistantships for significantly increasing enrolment in existing and New Masters and Doctoral Programme in Engineering Disciplines	20	2.500	
3	Enhancement of R & D and Institutional Consultancy Activities	05	0.625	
4	Faculty and Staff Development for improved competence based on Training Need Analysis	10	1.250	
5	Enhanced Interaction with Industry	05	0.625	
6	Institutional Management Capacity Enhancement	02	0.250	
7	Implementation of Institutional Reforms	01	0.125	
8	Academic support for Weak Students	02	0.250	
C) Incremental Operating Cost (10%)				
9	Incremental Operating Cost	10	1.250	
	Total	100	12.500	

According to the letter No. AC/TEQIP-II/IDP/2013 dated 18th January 2013, the 3 main categories of expenditure are A, B and C, as mentioned above.

A maximum of 45% of the total project allocation can be made under category A. There is no separate cap for the sub-categories of Goods i.e. [equipment, furniture, books & LRs, software and minor items], however, expenditure on Minor civil works should not exceed 3% of the institutional project allocation in respect of institutions under sub-component 1.2. It is also reiterated that the institution can revise their Procurement Plan with the approval of their BoGs as when deemed necessary.

The expenditure under the above main categories A and C, should not exceed the respective limits of 45% and 10% respectively. However, re-appropriation (if any) within the sub-categories of A, B and C, shall be approved by the Head of the Institution (Director). Fund from categories A (Procurement) and C (IOC) can also be re-appropriated to category B (Academic activities) but not vice versa.

2.13 (a) Provide the targets against the deliverables given in Table 35.

Table-35 : Project Targets⁵ for Institutions under Sub-Component 1.2

S.No	Deliverable	Baseline	Target to be achieved	
			At the end of 2 years of joining the Project	By Project closing
1	Number of students registered for			
	(a) Masters in Engineering programme (2014-15)	217	175	270
	(b) Doctoral Programme in Engineering (2014-15)	37		
2	Revenue from externally funded R&D projects and Consultancies in total revenue (Rs. in lakh)	104.53	126	143
3	Number of Research publications in refereed journals			
	• National journals	25	50	75
	• International journals	75	170	300
	(b) Citations	700	75	100
	(c) Patents obtained / filed	01 / 02	05/02	07/02
	(d) Books	08	16	17
	(e) No. of R&D projects commercialized	01	01	02
4	Number of co-authored publications in refereed journals			
	(a) National	-	50	75
	(b) International	-	180	310
5	IRG as % of total recurring expenditure			
6	Student credentials Campus placement rate of			
	• UG students	80%	-	95%
	• PG students	20%	-	70%
	Average salary of placement package for (Rs in Lacs)			
	• UG students	6.00	4.00	4.50
	• PG students	4.50	4.25	4.75
7	Number of collaborative programmes with Industry	-	Atleast 2	12
8	Accreditation Status (obtained and applied for)	06 programme applied		100%
9	Vacancy position for faculty	172	Vacancy reduced to 55%	Zero vacancy
10	Percentage of regular faculty with PhD in Engineering disciplines	20.48%	Atleast 20%	Atleast 25 %

(b) Describe the Plan in detail for achievement of the above targets enumerated in Table-35.

- **Procurement** : Purchase of various equipment / software worth Rs. 2.00 Crore is in pipeline
- **TEQIP Assistantship**

Academic Year	No. of Students (PhD)	No. of Students (M.Tech)
2012-2013	01	02
2013-2014	04	04
2014-2015	05	05

- TEQIP Assistantship would be disburse to the students admitted in the Academic year 2015-2016 for increasing enrolment in PG and PhD programmes.
- Modernization of class rooms and laboratories.
- Fiscal Incentive to UG students would be provided for under taking Industry oriented R&D projects.
- Faculty members are encouraged to organize workshops/ seminars by inviting experts from Industry.
- Expenditure towards campus placements would be borne by the Institute, proposal in this regard is in pipeline.
- TEQIP members and faculty members are encouraged to organize Management Capacity Enhancement programme at NITJ.
- Contingency grant would be provided to the PG and PhD students who availed assistantship from TEQIP funds.
- Organizing Soft Skills programmes.
- Organizing summer and winter Schools for weak students under EAP.

2.14 Give an action plan to ensure that the project activities would be sustained after the end of the Project.

The identified main activities are scaling up of post graduate education and Research & Development. The recurring expenditures for this activity include consumables, Operations and Maintenance and the PhD fellowship. During the project period, sufficient infrastructure and proven capability will be developed to enable NITJ to earn projects from the industry, NGOs and government agencies. Thus the sustainability of recurring expenses will be obtained through research projects IRG and consultancy.

2.15 Provide Procurement Plan for the first 18 months for Goods and Civil Works in Table-36 and Consultant Services in Table-37 with budget and timeframe.

In addition to the already approved procurement plan / is in pipeline, the revised procurement plan for the year 2015-2016 is available at Annexure – "A"

2.16 Provide any other information related to special academic achievements of the institution.

- **Highest package of salary offered by the recruiter is Rs. 35.00 Lacs.**

	2012-13	2013-14	2014-15
Maximum Salary (in lakhs)	14.1 Lac	14.75 Lac	35 Lac

- First time NIT Jalandhar has signed the technology transfer to any industries for production of instruments.

The test rigs, viz. a viz. pulse-jet filtration test rig and industrial filtration rigs have been developed through a project supported by Instrumentation Development Programme (IDP) under Department of Science & Technology (DST), Government of India.

- Memorandum of Understanding (MoU) between Department of Textile Technology at Dr B R Ambedkar National Institute of Technology Jalandhar and The University of Bolton, UK has been signed on October 27, 2014 to facilitate and enhance academic co-operation. The following activities will be undertaken under MoU:

- Faculty / staff development and exchange;
- Student exchange;
- Seminars, research, conferences and workshops;
- Collaboration in the sharing of academic information, articles etc;
- Develop and provide training programmes.

- **Library Resources**

Library Resources: The Library has **1,03,456** volumes comprising books, standards, theses, CD-ROM, bound volumes of journals and videocassettes pertaining to various disciplines of Science, Engineering and Technology.

Video Library: The Institute Library is equipped with video viewing facility also. Audio-visual section is equipped with 29" T.V & VCP and Multimedia Projector. It has a collection of about 1850 videocassettes, and CDs.

Print Journals and Access to Electronic Journals: The Institute Library subscribes to about 106 current journals and magazines in print form and almost all dailies. In addition to the above, with the help of special financial aid from MHRD, Library provides online access to the various electronic resources being published by almost all the major publishers of the world.

- **Central Computer Facilities**

- The campus wide Networking consisting of Academic Zone, Hostel Zone and Residential Zone is with fiber optics (single mode) as backbone. Managed Layer 3/4 Switches are installed. The commissioning of this CWN has been done for 2250 nodes. Girls' and Boys' Mega Hostel has been put on Wi-Fi.
- A 300 Mbps Leased Line caters for the Internet facility of the institute

- **Students Achievement**

- Mr Umesh Kumar and Mr Kamal Kumar, M. Tech students in Department of I.C.E. participated in the Short Term Training programme on Performance Testing and Evaluation for SHP Stations during January 19-23, 2015 sponsored by Ministry of New and Renewable Energy, GOI, organized by Alternate Hydro Energy Centre, IIT- Roorkee.
- Mr. Rajesh Kumar Gupta a student of 2nd year M.Tech Chemical Engineering has been awarded Golden Jubilee Scholarship by the Indian Institute of Chemical Engineers Northern Regional Centre New Delhi for the academic year 2014-2015.
- P. Sasidhar M. Tech (Structural and Construction Engineering) student was awarded best M.Tech thesis in the area of concrete by Indian concrete institute –ultratech cements. Supervisor of thesis –Dr. Rizwan A Khan.


- Arpit Jain student of IPE Department Served as a Secretary of SAE (Society of Automobile Engineer).
- Mr PraginBangotra student of Physics Department attended Refresher Course in "Experimental Physics" sponsored by Indian Academy of Sciences (11-26, November 2014), VVIET, Mysore, India.
- Mr RajanJakhu student of Physics Department attended refresher course in "Experimental Physics" sponsored by Indian Academy of Sciences 11-26 November 2014, VVIET, Mysore.
- Relativistic Guiding of Dark Hollow Laser Beam in Axially Non uniform Plasma Channel (2014), Presented in "29th National Symposium on Plasma Science and Technology & International Conference on Plasma and Nanotechnology" Mahatma Gandhi University, Kottayam, Kerla, India, Dec 8-11, 2014. Rajpreet Kaur, Naveen Gupta and Arvinder Singh students of Physics
- Naveen Gupta and Arvinder Singh students of Physics Department, Beat Wave Excitation of Electron Plasma Wave by Cross Focusing of Intense Cosh Gaussian Laser Beams in Plasma (2014), Presented in "29th National Symposium on Plasma Science and Technology & International Conference on Plasma and Nanotechnology" Mahatma Gandhi University, Kottayam, Kerla, India, Dec8-11, 2014.

2.17 Provide an action plan for organising a Finishing School and for improving the academic performance of SC/ST/OBC/academically weak students through innovative methods, such as remedial and skill development classes for increasing the transition rate and pass rate with the objective of improving their employability.

See Annexure "B"

Annexure "A"

Procurement Plan

 Note: Package coding- Department/YY/S.No.

Procurement Plan for the Department of Chemical Engineering

Package No.	S.No	Descriptions of Works / Goods	Estimated Costs (Rs) in Lacs.	Method of Procurement	Design / investigation completed / specification finalization (Date)	Estimate Sanctioned (Date and Value)	Preparation of BID document (Date)	Bank's No Objection to Bidding Documents (Date)	Bids		Contract Award (Date / Value)	Date of Completion of Contract
									Invitation (Date)	Opening (Date)		
1	2	3	4	5	6	7	8	9	10		11	12
CH-1501	1	Portable Double Beam UV-Visible Spectrophotometer	6.00	As Per Norms	Annexure CH	July 2015	August 2015	-	September 2015		October 2015	Dec.2015
CH-1502	2	Laser Diffraction Particle Size Analyzer	25.00			July 2015	August 2015	-	September 2015		October 2015	Dec.2015
CH-1503	3	Ultra Pure Water Purification System	6.00			July 2015	August 2015	-	September 2015		October 2015	Dec.2015
CH-1504	4	Trace Metal Analyzer	20.00			July 2015	August 2015	-	September 2015		October 2015	Dec.2015
CH-1505	5	Ultrasonic Probe Sonicator	5.00			July 2015	August 2015	-	September 2015		October 2015	Dec.2015

Procurement Plan for the Department of Electronics and Communication Engineering

Package No.	S.No	Descriptions of Works / Goods	Estimated Costs (Rs) in Lacs	Method of Procurement	Design / investigation completed / specification finalization (Date)	Estimate Sanctioned (Date and Value)	Preparation of BID document (Date)	Bank's No Objection to Bidding Documents (Date)	Bids		Contract Award (Date / Value)	Date of Completion of Contract
									Invitation (Date)	Opening (Date)		
1	2	3	4	5	6	7	8	9	10		11	12
ECE-1501	1	Net Sim Standard Software (Complete Suite with 8 tool boxes) – 5 User License	10.76	As Per Norms	Annexure ECE	July 2015	August 2015	-	September 2015		October 2015	Dec.2015
ECE-1502	2	Wireless Sensor network Development system	4.80			July 2015	August 2015	-	September 2015		October 2015	Dec.2015
ECE-1503	3	FPGA based reprogrammable SDR communication System	3.80			July 2015	August 2015	-	September 2015		October 2015	Dec.2015
ECE-1504	4	Pulse Plethysmograph (PPG) Amplifier and Sensor with existing MP 150 system in the lab	0.96			July 2015	August 2015	-	September 2015		October 2015	Dec.2015
ECE-1505	5	Pulse Oximeter Amplifier and Sensor compatible with existing MP 150 system in the lab	2.56			July 2015	August 2015	-	September 2015		October 2015	Dec.2015
ECE-1506	6	Temperature Amplifier and Skin sensor compatible with existing MP 150 system in the lab	0.96			July 2015	August 2015	-	September 2015		October 2015	Dec.2015
ECE-1507	7	Heart Sound Sensor and Amplifier compatible with existing MP 150 system in the lab	0.89			July 2015	August 2015	-	September 2015		October 2015	Dec.2015

ECE-1508	8	Disposable Electrodes (Consumables) compatible with existing MP 150 system in the lab (Qty - 5000)	1.00	As Per Norms	Annexure ECE	July 2015	August 2015	-	September 2015	October 2015	Dec.2015
ECE-1509	9	Uni and Multi-dimensional signal processing with general purpose Microprocessor, DSP and Reconfigurable Logic with associated accessories	7.80			July 2015	August 2015	-	September 2015	October 2015	Dec.2015
ECE-1510	10	Heat Sensitive Imager	3.00			July 2015	August 2015	-	September 2015	October 2015	Dec.2015
ECE-1511	11	Arduino development platform, with various sensors, Development boards, practice PCBs, USB programming etc (Qty 02)	1.50			July 2015	August 2015	-	September 2015	October 2015	Dec.2015
ECE-1512	12	Universal Arm Development board, with USB IAR Jtag debugger, and compiler, with support various ARM Controller like LPC 1768, 2148 series of controllers etc (Qty 02)	1.10			July 2015	August 2015	-	September 2015	October 2015	Dec.2015

Procurement Plan for the Department of Instrumentation and Control Engineering

Package No.	S.No	Descriptions of Works / Goods	Estimated Costs (Rs) in Lacs	Method of Procurement	Design / investigation completed / specification	Estimate Sanctioned (Date and	Preparation of BID document (Date)	Bank's No Objection to Bidding Documents (Date)	Bids		Contract Award (Date / Value)	Date of Completion of Contract
									Invitation (Date)	Opening (Date)		
1	2	3	4	5	6	7	8	9	10		11	12
ICE-1501	1	Linear Motion Control System	16.52	As Per Norms	Annexure ICE	July 2015	August 2015	-	September 2015		October 2015	Dec.2015
ICE-1502	2	Vibration Meter	11.80			July 2015	August 2015	-	September 2015		October 2015	Dec.2015
ICE-1503	3	Ultrasonic Flow Meter	7.00			July 2015	August 2015	-	September 2015		October 2015	Dec.2015
ICE-1504	4	Vital Sign Simulator ProSim 8 Vital Sign Simulator with SpO2 Test Module	8.00			July 2015	August 2015	-	September 2015		October 2015	Dec.2015
ICE-1505	5	Sensor based Measurement and Data Acquisition System	15.00			July 2015	August 2015	-	September 2015		October 2015	Dec.2015
ICE-1506	6	WSN Simulator (NetSim)	10.00			July 2015	August 2015	-	September 2015		October 2015	Dec.2015
ICE-1507	7	NI Vibration monitoring and Diagnostic of rotary system setup based upon real time controller (NI-cRIO)	13.00			July 2015	August 2015	-	September 2015		October 2015	Dec.2015
ICE-1508	8	Integrated Stepper motor and driver unit	4.00			July 2015	August 2015	-	September 2015		October 2015	Dec.2015
ICE-1509	9	Integrated Servo motor driver unit	4.00			July 2015	August 2015	-	September 2015		October 2015	Dec.2015
ICE-1510	10	Ball Screw based Linear Motion Control Test bench	8.00			July 2015	August 2015	-	September 2015		October 2015	Dec.2015
ICE-1511	11	Digital Storage Oscilloscope	2.50			July 2015	August 2015	-	September 2015		October 2015	Dec.2015
ICE-1512	12	Dual Power Supply	1.50			July 2015	August 2015	-	September 2015		October 2015	Dec.2015

Procurement Plan for the Department of Industrial and Production Engineering

Package No.	S.No	Descriptions of Works / Goods	Estimated Costs (Rs) in Lacs	Method of Procurement	Design / investigation completed / specification finalization (Date)	Estimate Sanctioned (Date and Value)	Preparation of BID document (Date)	Bank's No Objection to Bidding Documents (Date)	Bids		Contract Award (Date / Value)	Date of Completion of Contract
									Invitation (Date)	Opening (Date)		
1	2	3	4	5	6	7	8	9	10		11	12
IPE-1501	1	Versatile Training Robot &workcell	18.46	As Per Norms	Annexure IPE	July 2015	August 2015	-	September 2015		October 2015	Dec. 2015

Procurement Plan for the Department of Mechanical Engineering

Package No.	S.No	Descriptions of Works / Goods	Estimated Costs (Rs) in Lacs	Method of Procurement	Design / investigation completed / specification finalization	Estimate Sanctioned (Date and Value)	Preparation of BID document (Date)	Bank's No Objection to Bidding Documents	Bids		Contract Award (Date / Value)	Date of Completion of Contract
									Invitation (Date)	Opening (Date)		
1	2	3	4	5	6	7	8	9	10		11	12
ME-1501	1	Multi Channel Machinery health monitoring system	19.00	As Per Norms	Annexure ME	July 2015	August 2015	-	September 2015	October 2015	Dec. 2015	
ME-1502	2	Multi Process Welding Set of 400 A Capacity (Digital)	5.00			July 2015	August 2015	-	September 2015	October 2015	Dec. 2015	
ME-1503	3	Plasma CNC and portable Oxy fuel profile cutting machine	11.00			July 2015	August 2015	-	September 2015	October 2015	Dec. 2015	
ME-1504	4	Current Probe-500 Amps compatible with Digital Storage Oscilloscope	6.00			July 2015	August 2015	-	September 2015	October 2015	Dec. 2015	
ME-1505	5	Plasma Welding Machine of 300 Amps	8.00			July 2015	August 2015	-	September 2015	October 2015	Dec. 2015	
ME-1506	6	Electrode Manufacturing Plant	20.00			July 2015	August 2015	-	September 2015	October 2015	Dec. 2015	
ME-1507	7	SMAW Power Source (400 Amps)	1.70			July 2015	August 2015	-	September 2015	October 2015	Dec. 2015	
ME-1508	8	Ferritescope Specifications	3.00			July 2015	August 2015	-	September 2015	October 2015	Dec. 2015	
ME-1509	9	Computer System	9.20			July 2015	August 2015	-	September 2015	October 2015	Dec. 2015	
ME-1509-01		Peripherals Devices				July 2015	August 2015	-	September 2015	October 2015	Dec. 2015	

ME-1510	10	1000BTU AHU Air Handling unit Trainer	17.00			July 2015	August 2015	-	September 2015	October 2015	Dec. 2015
ME-1511	11	<i>aspenONE for universities</i> Exchanger design and rating suite with all the modules	12.60			July 2015	August 2015	-	September 2015	October 2015	Dec. 2015
ME-1512	12	Data Acquisition System (Qty 2)	5.50			July 2015	August 2015	-	September 2015	October 2015	Dec. 2015
ME-1513	13	T-Solar PV Grid-Tied Training System	3.40	As per norms	Annexure "ME"	July 2015	August 2015	-	September 2015	October 2015	Dec. 2015

Procurement Plan for the Department of Textile Technology

Package No.	S.No	Descriptions of Works / Goods	Estimated Costs (Rs) in Lacs	Method of Procurement	Design / investigation completed / specification	Estimate Sanctioned (Date and Value)	Preparation of BID document (Date)	Bank's No Objection to Bidding Documents (Date)	Bids		Contract Award (Date / Value)	Date of Completion of Contract
									Invitation (Date)	Opening (Date)		
1	2	3	4	5	6	7	8	9	10		11	12
TT-1501	1	High Pressure Liquid Chromatography (HPLC)	20.00	As Per Norms	Annexure TT	July 2015	August 2015	-	September 2015		October 2015	Dec. 2015
TT-1502	2	UV Fabric Analyser	20.00			July 2015	August 2015	-	September 2015		October 2015	Dec. 2015

Specifications of the equipments

Annexure - CH

S.No	Item Name	Specification
1	Portable Double Beam UV-Visible Spectrophotometer	<p>A portable Microprocessor based UV-Vis Spectrophotometer having following specifications:</p> <p>Photometric System : Double beam optics</p> <p>Photometric range : Absorbance: -4 to +4.0 Abs, Transmittance: 0.0 to 400%</p> <p>Photometric Accuracy : +/- 0.004 Abs at 1.0 Abs& +/- 0.002 Abs. at 0.5 Abs</p> <p>Wavelength Range : 190to 1000 nm or better</p> <p>Wavelength Accuracy : +/- 0.1 nm or better</p> <p>Wavelength Repeatability : +/- 0.1 nm or better</p> <p>Photometric Repeatability : +/- 0.001 Abs or better</p> <p>Scanning speed : Selectable up to 3000 nm/min or better</p> <p>Spectral Bandwidth : variable/1 nm or better</p> <p>Stray light : Less than 0.02% at 220nm& 340 nm.</p> <p>Baseline Stability : Less than 0.0003 Abs/H</p> <p>Baseline Flatness : less than 0.0006 Abs/H</p> <p>Noise Level : Less than 0.00005 Abs</p> <p>Monochromator : Czerny Turner blazed holographic grating</p> <p>Detector : Silicone photodiode (02 Nos.)</p> <p>USB Port :3-4 USB ports for data storage/Transfer, Laptop/PC, Connectivity</p> <p>Light source : Tungsten and Deuterium lamp.</p> <p>Quartz Cuvette : 3 mL capacity with path length of 10mm (02 Pairs)</p> <p>Windows based Operating software should have built in features like real time concentration display, Photometric mode Single / multi-wavelength, Enzyme Kinetics calculation, DNA/protein quantification etc.</p>

	<p>Spectrophotometer must have built-in display so that user can use it in the stand alone mode.</p> <p>Branded PC Core i5 processor, 2 GB RAM, ITB HOD and compatible online UPS with 30 minutes back up to be quoted for UV Spectrophotometer along with the laser printer.</p> <p>Spectrophotometer should have built in hardware validation for Wavelength accuracy, wavelength repeatability, resolution, stray light, photometric accuracy, photometric repeatability, baseline flatness, baseline stability, noise level and validation software along with optical filter for wavelength calibration. Two pair of cuvette (quartz) extra to be provided with this instrument.</p> <p>Note: The supplier must give the training to the concerned lab staff to use this machine and related software. The supplier may also take care of the maintenance of this machine for one year including the expenses incurred on the executive visit. The supplier may be asked to furnish the list of Institutes like IITs, NITs, etc to whom this m/c has been supplied recently.</p>
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2	Laser Diffraction Particle Analyzer	<p>Principle of operation : Laser diffraction technology</p> <p>Particle size range : 20 nm - 2500 μm(for wet analysis) or better</p> <p>Source type : Semiconductor/He-Ne laser Class 1 type or better</p> <p>Mode of sample analysis : Suspensions, emulsions</p> <p>Sample Delivery System : Dispersion bath with 40 W Ultrasonic sonicator and stirrer for wet samples. Dispersion bath capacity approx. 250 cm^3, Frequency approx. 30 kHz or better, Selectable sample quantity: 100 mL, 200 mL, 300 mL</p> <p>Control and operation : Fully Automated</p> <p>Detection System : Forward scattering, side scattering, back scattering</p> <p>Scattering angle range : 0.05 - 140 Degrees or better range</p> <p>Software Features : Real time display of particle distribution measurement and simultaneous measurement indicating data processing with display of measurement conditions.</p> <p>Validation : Instrument validation must be performed with standards at the time of installation</p> <p>PC, Printer : Branded HP/Dell PC i5 Processor, 4 GB RAM, 1TB HOD, 19" LCD etcLaserjet Printer</p> <p>UPS : Compatible Online UPS with one hour backup</p> <p>Warranty : Three Years</p> <p>Installation : Proper Installation and routine maintenance Training to be provided by the supplier</p> <p>Note: The supplier must give the training to the concerned lab staff to use this machine and related software. The supplier may also take care of the maintenance of this machine for one year including the expenses incurred on the executive visit. The supplier may be asked to furnish the list of Institutes like IITS ,NITs, etc to whom this m/c has been supplied recently.</p>
3	Ultra Pure Water Purification System	<p>1stStage</p> <ul style="list-style-type: none"> • Ion Rejection> 94% , • Organic Rejection (for MW > 200) > 99%, • Bacteria and Particulates removal: 99%, • Production Flow rate: 3 L/hr. <p>Pre-filtration unit - 1 Stage with 5 Micron Filter</p> <ul style="list-style-type: none"> • All in one single pack containing a combination of technologies to produce pure (Type III) and ultra pure(Type I) water directly from tap. • First stage - Reverse osmosis and deionization cartridge for the removal of ions, organics, particulates and colloids.

		<p><u>Second stage –</u></p> <p>Mixed bed ion exchange resin for the removal of remaining ions and trace ionic and organic contaminants.</p> <ul style="list-style-type: none">• Final filtration - 0.22 µm final filter• Automatic recirculation• Preset of fixed volume dispense <p>Integrated inbuilt reservoir with tap for dispensing RO water Feed water handling conductivity:- up to 2000 microS/cm, Free chlorine up to 3 ppm & Fouling Index up to 12.</p> <p>The system should give the final water quality as:</p> <table><tr><td>Resistivity</td><td>: 18.2 MegaOhm cm.</td></tr><tr><td>Conductivity</td><td>: 0.055 uS/cm.</td></tr><tr><td>TOC</td><td>: < 10 ppb.</td></tr><tr><td>Bacteria</td><td>: < 0.1 cfu/ml</td></tr><tr><td>Flow rate</td><td>: 0.5 L/min</td></tr><tr><td>Particulates > 0.22µm:</td><td>: < 1 particulate/ml.</td></tr><tr><td>Progen level</td><td>: < 0.001 EU/ml</td></tr><tr><td>RNases</td><td>: < 0.01 ng/ml</td></tr><tr><td>DNases</td><td>: < 4 pg / µl</td></tr></table>	Resistivity	: 18.2 MegaOhm cm.	Conductivity	: 0.055 uS/cm.	TOC	: < 10 ppb.	Bacteria	: < 0.1 cfu/ml	Flow rate	: 0.5 L/min	Particulates > 0.22µm:	: < 1 particulate/ml.	Progen level	: < 0.001 EU/ml	RNases	: < 0.01 ng/ml	DNases	: < 4 pg / µl
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DNases	: < 4 pg / µl																			
4	Trace Metal Analyzer	<p>System should have following modes:</p> <p>ASV, CSV, AdSV, Cyclic Voltammetry, CVS, Sampled DC Voltammetry, Differential Pulse Voltammetry, Squarewave Voltammetry, AC voltammetry of 1st & 2nd Harmonic, Cyclic Voltammetry, Potentiometric Analysis, Trace Metal Analysis of Heavy Metals including Zn, Cd, Cu, Pb, Hg etc and also speciation like Fe²⁺, Fe³⁺, As³⁺, As⁵⁺, Cr³⁺, Cr⁶⁺ etc.</p> <p>System should comprise of potentiostat measuring assembly comprising of working electrode, auxiliary electrode, reference electrode, measuring vessel & stirrer. It should also have inbuilt or External dummy cell for diagnostic purposes. It should be possible to connect two automated motorized burettes for automatic addition of standards & Buffers. Burette should be provided as an independent unit that can also be used for the purpose of preparation of standard solutions</p>																		

		<p>Working Electrode: Pneumatically operated electrode for polarography. Mercury reservoir capacity should be maximum 5 to 6 mL should be sufficient to form about 200,000 drops. It should have following operating modes. Dropping Mercury Electrode, Hanging Mercury Drop Electrode, Stationary Mercury Drop Electrode. System should have RDE Control setup to use noble metals & graphite electrode tips as rotating disc electrodes.</p> <p>Accessories Required: Ag/AgCl Reference electrode, Glassy carbon electrode (01 No), Platinum electrode (01 No), Gold electrode (01 No), 10 Capillaries, needles, Electrode Polishing Set (01 Nos) & mercury 250 gm, Titration Vessel 5 ml (01 Nos), Ultra Trace Graphite Electrode 01 No).</p> <p>Potentiostat: Voltage Range: ± 12 Volts, Current Amplification Range: ± 35 mA, Sweep Rate: 35V/Sec maximum. Automatic Calibration, Buffer Addition & Liquid handling: System should have Software control Automatic Burettes (02 Nos) for automatic calibration, buffer addition & liquid handling.</p> <p>Win 95/98/XP/vista based software for data processing & calculation work. It should have facility to undertake measurement & data acquisition for various electrochemical measurements. Software should have capability of graphical presentation of acquired voltammograms & calibration curves on VDU of PC. Software should have facility data processing & quantification acquired in various electrochemical measurements given earlier. System should have possibilities to connect with autosampler and the same should be offered as optional. Only branded note book having 2GB RAM and at least 250 GB HD, and laser printer should be provided with the equipment. Mercury should be offered along with the system</p>
5	Ultrasonic Probe Sonicator	<ul style="list-style-type: none"> • Handheld and Stand mounted with base plate • Power 250, 500, 750 Watts ultra sonication • Instrument operating Voltage: 220-240 V, 50Hz • Frequency: 20kHz or better. • Automatic Frequency Tuning, Output Amplitude adjustable from 0 to 100%, • Colored touch-screen & Digital control • Timer, Temperature Probe and Power meter • In-built software for data transfer. • Automatic Data recording, dry running protection, IP41 grade • Probe horn dia- 2 mm- 20mm • Process sample volume (2ml to 250ml)

S.No	Descriptions of Goods	Specifications
1	Net Sim Standard Software (Complete Suite with 8 tool boxes) – 5 User License	<p>Includes Protocols: Aloha, Slotted Aloha, Token Bus, Token Ring, CSMA / CD, Fast and Gigabit Ethernet, Switching, Wireless LAN - 802.11 a / b / g, Routing - RIP, OSPF, BGP, TCP, UDP, MPLS, Mobile Adhoc Networks (MANET), Wi-Max, GSM, CDMA, Wireless Sensor Network (WSN), Zigbee, WRAN Cognitive Radios, LTE etc.)</p> <p>Net Patrol- Real time packet capture, Network Programming Exercises in C / C++ / Java, 26 exercises including ARP, CIDR, cryptography, Distance vector routing, Error correction codes, Error detection codes, Framing sequence, MLMA, PC to PC communication Scheduling, shortest path, Transmission flow control.</p> <p>Packet Trace and Event Trace Should be available in tab ordered .txt format for easy post processing</p> <p>Protocol Library Source Codes with Documentation Protocol primitive C source and appropriate protocol header files with extensive documentation. Simulation-in-the-loop debug facility using Visual Studio also supported.</p> <p>Development Environment Users can write their own code and link their code to the software for a set of primitives.</p> <p>Packet Animator</p>
2	Wireless Sensor network Development system	<p>Wireless sensor network development system with accessories</p> <p>The WSN system must be a complete system be based on IEEE 802.15.4 with a complete set of coordinators, routers, End device, intelligent end device with real time sensors, signal conditioners etc the system must be supplied with win based utility software for real time viewing, of the networks in star, ring and mesh networks , and configuration of software Bee configured as per bellow specifications) with indoor and outdoor applications.</p> <p>Zig Bee Coordinator (at 2.4 Ghz & 866 Mhz range) Zig Bee Coordinator system the coordinators must be designed around advance processors and must act as gateway with other wireless connectivity etc</p>

Zigbee 2.4 Ghz/ 865 Mhz with external antenna.
 Coordinator based on ARM 7 LPC2148 Supporting various Network Topology with RF data rate 250 kbps/80 kbps
 On board relays with isolated Output & one Buzzer for alarm activation On boards 20X4 LCD display for display for end device status.
 Facility to store the data SD Card for Storage
 Data entry using 4X4 Hex Keypad digital Input
 On Board USB Communication for PC Data transfer,
 Facility for switch selection for radio configuration, with / without processors
 On boards facility for GSM/GPRS & Bluetooth
 For data transfer
 On Board Power supply (5V, 3.3V) with rechargeable battery back up, enclouser,with configurable device software, for GUI based, along with testing utility , RF data rate 250 KBPS With software selectable Data rate, with input / output range 100Ft /300Ft. for support of 2.4 ghz and 865 Mhz .With power supply 2.8V.

Zig Bee Intelligent End Devices

The Zig Bee Intelligent End Device with USB interface, with ARM LPC 2148 Processor with SD card storage etc.
 Zigbee 2.4 Ghz/ 865 Mhzwith external antenna Supporting various Network Topology with RF data rate 250 kbps/80 kbps
 On board 6V relays with isolated Output & one Buzzer
 On board 16X2 LCD display.
 4 digital Input
 On Board Power supply (5V, 3.3V)
 Can Connect with any digital Sensor* 0-5V or with analog sensors,
 Zig Bee router Device with USB interface
 The Zig Bee router Device with USB interface, with ARM processor
 Zigbee 2.4 Ghz/ 865 Mhz with external antenna
 The device must act as router as well as intelligent device, with on boards radio, and pc transfer
 Supporting various Network Topology with RF data rate 250 KBPS,
 With software selectable Data rate, with input / output range 100Ft /300Ft.
 With power supply 2.8V.
 4Channel A/D,8 Digital Input / Output,2-PWM Output
 Zig Bee Non Intelligent Device with sensors

		<p>Zigbee 2.4 Ghz/ 865 Mhz with external antenna. On Board Configuration facility with USB End Devices to connect with sensor* in range 0 to 3.3 V analog or digital On Board Power supply (5V, 3.3V) Field deployable ready to use USB Powered/ Battery for zigbee In Build features of Zigbee for 2.4 GHz: Supporting various Network Topology with RF data rate 250 kbps With software selectable Data rate, with input / output range 10-100* meter. 4 Channel 10 bit internal AID, 8 Digital Input / Output In Build features of Zigbee four 865 MHz:</p> <p>Sensors and control systems</p> <p>The system must be supplied with various sensors like temp, humidity, Motion sensors, Accelerometers, smoke sensors, for real time data collection as well as setting the real network .</p> <p>Note: All the end nodes must be packed in plastic encloser weather proof, battery backed. The coordinators must also have the same plastic encloser, The end nodes must also be provided with a test zig for fault debugging. The system must be configured with software utility. The supplier need to provide the complete training and hands to the complete, The supplier must have supplied the similar setup to some reputed govt institutions'</p>
3	FPGA based reprogrammable SDR communication System	<p>The Advance communication Development Board provides a fully integrated, communication platforms for performing variety of experiment, measurement of BER , Etc ,Peripheral platform with continuous frequency coverage from 70 MHz -6 GHz. it combines a fully integrated direct conversion transceiver providing real-time bandwidth of200 kHz to 56 MHz,. Based on Xilinx Zynq SOIC (Zed Board).</p> <p>And with Dual ARM Cortex A9 ,</p> <p>The system must have JTAG Support, for RTL development.</p> <p>The system must provide support for LCD HDMI monitors, along with</p> <p>The system must have JTAG Support, for RTL development.</p> <p>The system must provide support for LCD HDMI monitors, along with</p> <p>MIC and Audio out, for experiments.</p>

	<p>On board Gigabit Ethernet connections</p> <p>Compatible with GNU Radio for SDR system development.</p> <p>512 MB of SDRAM</p> <p>16 GB of QSPI Flash</p> <p>10/100/1000 Ethernet Interface</p> <p>USB-DART Interface</p> <p>microSD Card Interface</p> <p>USB 2.0 4-Port HUB</p> <p>FMC HPC Slot (VADJ of 1.8 V, 2.5 V, or 3.3 V)</p> <p>Software tunable across wide frequency range (70 MHz to 6.0 GHz) with a channel bandwidth of $\nu < 200$ kHz to 56 MHz</p> <p>Phase and frequency synchronization on both transmit and receive paths</p> <p>2 Tx / 2 Rx ports</p> <p>External Reference Clock source can be connected</p> <p>AGC, Quadrature calibration and DC offset calibration</p> <p>NF: 2.5dB @ 1GHz</p> <p>ADC: Continuous time sigma-delta, 640MSPS, 12bit adc</p> <p>Digital Filters: 128 complex taps, decimation between 2 and 48</p> <p>Gain: 1dB step size, 80dB analog range, 30dB digital range (post ADC scaling)</p> <p>Max input power 0dBm</p> <p>Supports up to 2 direct conversion RF receive channels</p> <p>Fully integrated synthesizers (including loop filter)</p> <p>Data path consists of digital filters, DAC and Modulators</p> <p>Digital Filters: 128 complex taps, interpolation between 2 and 48</p> <p>Gain: 0.25dB step size, 86dB range</p> <p>DAC: 320MSPS</p>
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4	Pulse Plethysmograph (PPG) Amplifier and Sensor with existing MP 150 system in the lab	Gain : 10,20, 50 ,100
		Output range : ± 10 V (Analog)
		Low pass filter : 3Hz, 10 Hz
		High pass filter : DC , 0.05 Hz, 0.5 Hz
		Noise voltage : 0.5 μ V rms – amplifier contribution
		Excitation : 6V
		Signal Source : TSD 200 pulse transducer
		Weight : 350 gm
		Dimensions : 4cm (wide) X 11 CM (Deep) X 19 CM (High)
		Excitation voltage : 6.0 V
		Upper frequency response : 10 Hz
		Lower frequency response : DC or 0.05 Hz or 0.5 Hz
		Noise voltage : 0.5 μ V (rms) – amplifier contribution
		Sensor Specification
		Emitter / Detector wavelength : 860nm 60nm
		Optical low pass filter cut of wavelength : 800nm
		Nominal output : 20mV (peak - peak)
		Power : 6VDC excitation @ 5mA
		Sterilizable : yes

5	Pulse Oximeter Amplifier and Sensor compatible with existing MP 150 system in the lab	<p>Output : SpO₂, Pulse rate, pulse wave form & module status</p> <p>Pulse rate range : 18-321 BPM</p> <p>SpO₂ range : 0-100%</p> <p>SpO₂ accuracy : 70-100% ± 2 %</p> <p>Measurement wavelength red : 660 nm @ 0.8mW maximum average and output power : infrared : 910nm @ 12mW maximum average</p> <p>Operating temperature range : 0-50 degree C</p> <p>Operating humidity range : 10-90%(non-condensing)</p> <p>Beat to Beat (Un averaged, Non-slew limited, Beat to Beat value)</p> <p>Fast (Non-slew limited, 4 Beat average)</p> <p>Standard (4 beat average, slew limited)</p> <p>Extended (8 beat average, slew limited)</p> <p>Finger clip sensor transducer</p> <p>Subject Range : > 30 kg (66 lbs)</p> <p>Preferred application : Index, middle or ring fingers</p> <p>Length : 1m</p>
6	Temperature Amplifier and Skin sensor compatible with existing MP 150 system in the lab	<p>Gain : 5,2,1,0.5⁰ F/V- can also calibrate in ⁰ c</p> <p>Output Range : ± 10 V (Analog)</p> <p>Low Pass Filter : 1Hz, 10 Hz</p> <p>High Pass Filter : DC, 0.05Hz, 0.5 Hz</p> <p>Sensitivity : 180 micro ⁰F (100 micro ⁰C)</p> <p>Sensor Specification</p> <p>Sensor Type Skin with Response Time of 1.1 Sec.</p> <p>16mm (long) X 17 mm (wide) X 8 mm (high)</p> <p>Nominal Resistance : 2252Ω at 25⁰C</p> <p>Maximum Operating Temperature : 60⁰ C(when used with SKT 100C)</p> <p>Accuracy and Interchangability : 0.2⁰ C</p> <p>Cable Length : 3 meters</p>

7	Heart Sound Sensor and Amplifier compatible with existing MP 150 system in the lab	<p>Gain : 50,200,1000, 5000</p> <p>Output range : $\pm 10V$ (analog)</p> <p>Frequency response Maximum Bandwidth (DC-5,000 Hz) : 10Hz, 300 Hz, 5000Hz</p> <p>Low Pass Filter : DC, 0.05 Hz</p> <p>High Pass Filter : $\pm 200mV$ (Protected)</p> <p>Input Voltage (max) : $0.11\mu V$ rms – (0.05-10Hz)</p> <p>Noise Voltage : $0.3 \mu V/^{\circ}C$</p> <p>Temperature Drift : $2M\Omega$</p> <p>Z (Differential input) : 90dB min</p> <p>CMRR</p> <p>CMIV – referred to Amplifier Ground : $\pm 10V$</p> <p>Main Ground : $\pm 1500VDC$</p> <p>Sensor Specification</p> <p>Frequency response : 35 Hz to 3500 Hz</p> <p>Housing : Stainless Steel</p> <p>Sterilizable : Yes (Connect BIOPAC for detail)</p> <p>Noise : $5\mu V$ rms – (500Hz – 3500 Hz)</p> <p>Output : 2V (p-p) maximum</p> <p>Weight : 9g</p> <p>Dimensions : 29 mm diameter, 6 mm thick</p> <p>Cable length : 3m</p>
8	Disposable Electrodes (Consumables) compatible with existing MP 150 system	-
9	Uni and Multi-dimensional signal processing with general purpose Microprocessor, DSP and Reconfigurable Logic with associated accessories	<ul style="list-style-type: none"> • High speed data bus • Clock speed in Mega hertz onwards • Embedded timers • Reconfigurable • Associated accessories
10	Heat Sensitive Imager	<ul style="list-style-type: none"> • Resolution: 160 x 120 pixels • Sensitivity: $< 0.045^{\circ}C @ +30^{\circ}C (+86^{\circ}F) / 45 mK$ • Lens:FOV53°x41° • Field of view: 25° x 19° • Images storage: Standard JPEG, including measurement data, on memory card

		<ul style="list-style-type: none"> • Video storage: MPEG-4 to memory card • Connection: USB
11	<p>Arduino development platform, with various sensors, Development boards, practice PCBs, USB programming etc (Qty 02)</p>	<p>The total package must contain various arduino family boards, like arduino uno and mega, Along with various shield Like ETHERNET, WI-FI , Bluetooth , wireless shield, motor shield along with a ,Set of zigbee, GSM , GPS modems, RFID Modems Microcontroller ATmega328 Operating Voltage 5V Input Voltage 7-12V Input Voltage 6-20V Digital I/O Pins 14 (of which 6 provide PWM output) Analog Input Pins 6 DC Current per I/O Pin 40 mA DC Current for 3.3V Pin 50 mA Flash Memory 32 KB (ATmega328) EEPROM 1 KB (ATmega328) Clock Speed 16 MHz</p> <p>The system also provide 4x 4 matrix key pad, RTC with battery back-up. Two 12V relays with isolated O/Ps. All interrupts available on header. 16X2 LCD display, 128x64 8 I/Ps from DIP switches. 8 O/Ps available on LED's Four multiplexed 7-segment displays 4 push buttons for interrupt study, USB Interface to be programming with PC PS2 keyboards, for Data entry interface RC 5 remote control interface, Windows based driver software for programming</p>
12	<p>Universal Arm Development board, with USB IAR Jtag debugger, and compiler, with support various ARM Controller like LPC 1768, 2148 series of controllers etc (Qty 02)</p>	<p>USB Jtag debugger, and IDE compiler, with Support For Various ARM series of controllers etc Specification</p> <p>1) LPC 2148 Based Daughter card ,</p> <ul style="list-style-type: none"> on LPC 2148, 12MHz default, upto 60 MHz with on chip PLL FLASH-512KB, SRAM-32KB USB 2.0 Connector ADC: 16 Channel, 10 bit DAC: One 10 bit DAC output On-Chip RTC with battery Backup Two RS232 serial ports Interface circuit for on board <p>2) LPC 2138 Based Daughter card,</p>

on LPC 2138, 12MHz default, upto 60 MHZ with on chip PLL
FLASH-512KB, SRAM-32KB USB 2.0 Connector
ADC : 16 Channel, 10 bit DAC: One 10 bit DAC output
On-Chip RTC with battery Backup Two RS232 serial ports
Interface circuit for on board

3) LPC 1768 Based daughter boards

The system must have a mother board along with different arm Daughter boards,
Must have On boards relays. on board Buzzer, Interface Circuit
Facility for interface 128x64 Graphics Display
LCD 16x2 display:
8 no. of general purpose keys on board LED
Facility for 4x4 key-matrix connected to the port lines of the controller.
Interface circuit for Stepper motor.
On board LM3S interface to measure temperature.
the system must be supplied with user manual and facility to interface with other interface modules. Like GSM ,
Bluetooth and rfid interface application modules

S.No	Description of Goods	Specifications
1	Versatile Training Robot & Workcell	<p>The Versatile Training Robot & Workcell</p> <p>Mechanical Structure of Robot should be vertically articulated; open frame, where Transmission Gears, timing belts, lead screw and motors are visible.</p> <p>The Training robot should be compatible of welding application and Material Handling.</p> <p>The robot should be supported by 3D graphic software that lets students design, create and control simulated industrial workcells.</p> <p>The Robot should be operated directly from the Computer / Teach pendent.</p> <p>The Robot should be supplied with Multi-purpose gripper attachment for rectangular pieces.</p> <p>Mechanical Arm</p> <p>Degrees of Freedom : 5</p> <p>Payload Capacity : 2 kg or above</p> <p>Axis Range</p> <p>Axis 1 : Base rotation above 300 degree</p> <p>Axis 2 : Shoulder rotation + (110-140) / - (30-40) degree</p> <p>Axis 3 : Elbow rotation +120-140 degree</p> <p>Axis 4 : Wrist pitch +120-140 degree</p> <p>Axis 5 : Wrist rolls above ± 550 degree</p> <p>Reach : 600 mm or above with gripper</p> <p>Speed : 600 - 700 mm/sec</p> <p>Repeatability : Max ± 0.20 mm</p> <p>Standard gripper : Servo motor, parallel fingers</p> <p>Homing : Microswitch on each axis,</p> <p>Actuators : servo motor on each axis</p> <p>Controller</p> <p>Axis control : Real-time; PID; PWM</p> <p>Communication : USB type cable connection to Computer; Plug and play without rebooting; 2 integrated RS232 channels: one for teach pendant; one for controller I/O card.</p>

	<p>Inputs/Outputs : 8-10 digital inputs; 4-6 analog inputs; 6-8 digital outputs; 2-3 analog outputs.</p> <p>Microcontroller : Full featured, 32-bit microcontroller</p> <p>Servo axis drivers : 6 for robot & 2 for peripherals</p> <p>User Memory : Unlimited programs, program lines and variables, positions.</p> <p>Position Definition : XYZcoordinates, Joint coordinates (degrees), Absolute, Relative, Cartesian, Joints,</p> <p>Encoder counts</p> <p>Trajectory Control : Joint, Linear, Circular.</p> <p>Speed Definition (software) : 8 or above speed settings; travel time definition</p> <p>Servo control; PID, speed, velocity profile, smoothing; axis position error; gripper operation; thermic, impact, limit protection; homing; Cartesian calculations.</p> <p>Safety Features : Emergency switches; short-circuit protection; automatic shut-down upon detection of impact, overheating, PC failure or communication error.</p> <p>Programming Tool</p> <ol style="list-style-type: none"> 1. Robotic programming and operation tool. 2. 3D graphic tool- which shall enable actual tracking of the robotic cell. 3. Robotic learning software with three levels of complexity. 4. A robot control and programming PC based application which communicates with a USB robot controller over a USB channel. 5. provides trajectory control for point to point, linear, and circular types of movement. <p>2.0 Accessories</p> <p><u>Teach pendant</u></p> <p>Functions:</p> <ul style="list-style-type: none"> • Should control up to 8 axes connected to the robot controller. • Should have movement according to encoder coordinates (Joint mode) and Cartesian coordinates (XYZ mode) <p>Linear Conveyor</p> <p>The linear conveyor belt serves to transport parts to and from the robot work area.</p> <p>The conveyor should be normally driven by the robot controller as a servo axis, but should also be directly operated in open-loop by connecting to power supply.</p> <p>Design</p>
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- Metal base, heavy duty PVC belt
- Dimensions: L=800 to 900 mm, W=90 to 120 mm, H=90 to 110 mm
- Belt width: minimum 80 mm
- Adjustable side supports enable tilting of conveyor up to 5° angle
- Predrilled holes enable sensor attachment to conveyor and conveyor attachment to workbench

Drive and control

- Motor with high resolution optical encoder
- Controlled by axis driver in robot controller via software
- Variable travel speed

Additional components - cable with connector for connection to axis driver in controller Safety

3. Proximity sensor for linear conveyor

A cylindrical photoelectric sensor with built-in amplifier for use as an optical proximity switch. The sensor unit should include a mounting bracket for attachment to the conveyor. The sensor is powered by the robot controller's power supply and monitored by anyone of the controller inputs.

Design

- Cylindrical photoelectric sensor
- Built-in amplifier
- Operation
- Operating state: Light-On
- Switching output: NPN open collector
- Detection method: Diffuse reflective
- Detection distance: minimum 80 mm
- Response time: 2.5 ms max.

Additional components

Mounting bracket for attaching sensor to conveyor

Cable for connection to controller input

4. Gravity parts feeder with microswitch sensor

Design

- Table-top mounting

**Dimensions**

- Feeder plate: 2-5 mm x 140-160 mm x 280-330 mm
- Adjustable front leg support: 140 mm - 215 mm
- Adjustable rear leg support: 215 mm - 300 mm

Slide

- Angle: adjustable, 0 - 40°
- Width: adjustable, 25 mm - 100mm
- 2 guide rails: 10-15 mm x 280-320 mm
- Adjustable end stops on guide rails

Additional components

- Part-sensing microswitch with I/O connecting leads at part pick-up position

5. I/O experiment table

The I/O experiment table should demonstrate the concept and uses of inputs and outputs.

The table should contain a lamp, a buzzer and minimum four micro switches, which should be connected to the robot controller. The table should allow students to practice operation and programming of controller inputs and outputs. The table can be used as stand-alone lab accessory, or integrated in a robotic workcell.

Design

Dimensions: L=150-200 mm, W=300-350 mm, H=50-100 mm

Inputs

Minimum 4 micro switches

Outputs

- Lamp
- Buzzer

Additional components

- Two batteries, mounted internally
- Set of wooden cubes and plastic cylinders, of various size

6. Parts Bin**Design**

Dimensions: 150-180 x 150-180 x 80-130 mm

7.0 Robotic Simulation Tool

		Robotic Workcell setup	<p>Interactive graphic setup should enables creation of virtual roboticworkcells.</p> <ul style="list-style-type: none"> • Simple point and click manipulation of object for placement and definition. • Peripheral axis placement and connection: conveyor belts, XV tables, rotary tables, linear slide bases. • Part definitions and properties: color, size, position; unlimited number of parts of any shape or color. • -Definition and connection of sensors and I/O devices. • Definition of parts in storage devices and feeders; feeders can supply any quantity of any part. • Definition of CNC machines, control of machine doors and machine cycle time. • Predefined welding cell; user can modify. • - CAD file import utility for user-defined parts and objects.
		Programming and Control	Fully integrated with robotics software, an intuitive tool for programmingand operating robotic workcells.
		Interface languages	Can be easily translated into any user language
		Dynamic 3D simulation	<p>Fully functional 3D graphic display module provides dynamic simulationand tracking ofthe robot and devices in the workcell.</p> <ul style="list-style-type: none"> • Simulation of robot movements and gripper part manipulation. • Simulation of peripheral axes: conveyor belts, XV tables, rotary tables, linear slide bases • Simulation of CNC mills and lathes: moveable machine parts such as door, chuck and spindle; user-definable machine cycle-time; CNC processing reflected in shape of virtual parts. • Simulation of automated welding system: welding of multiple parts of varying shapes; full simulation of welding parameters: wire feed rate, robot speed, inert gas shield and voltage; analysis and simulated display of weld according to welding parameters allows users to study parameters effect on weld quality; incorrectly set parameters or misplaced objects results in flawed or failed weld • Simulation of parts: objects fall according to laws of gravity; stacked objects move together when lower object is moved; feeders supply parts according to user-defined properties and quantities. • Simulation of different types of sensors. • Detection and response to impact conditions and axis limits. • Point and click on screen to move the robot and teach position.

		<ul style="list-style-type: none"> • Display of robot origin, work envelope and gripper position. • Display of coordinates of workcell objects and devices: absolute positions • or positions relative to robot origin. • Display of names of robot, workcell objects and devices. • Various viewing and display controls; zoom, rotate, pan, drag, redirect, Continuous follow-me camera, shading and lighting. • Display of gripper path during robot movement. • Can simultaneously display 3 different 3D views of robotic cell.
8) Visual Inspection And Quality Control		
	Description	<p>The system to feature interactive imaging software, designed for scientific and industrial applications. The software to provide access to an extensive set of optimized functions for image processing and enhancement, blob analysis, gauging and measurement, and pattern matching.</p> <ul style="list-style-type: none"> • The package also to include a USB digital color camera with a lens that provides 24-bit color, 8 million pixel digital pictures and video at 1600 x 1200 pixels (approx.). • To use a standard VBA scripting language, which would be used for programming automated quality control applications (such as inspections, part counting and gauging) and robot guidance applications, and to interface with other Windows applications, such as Microsoft Excel. • The system to be integrated in an FMS/C1M system for part inspection and quality control.
	Specification	Carl Zeiss ® lens/ equivalent
		Autofocus system
		Ultra-high resolution 2-megapixel sensor with RightLight'M2 Technology
		Colour depth: 24-bit true colour (approx.)
		Video capture: Up to 1600 x 1200 pixels (HD quality) (HD Video 960 x 720 pixels) (approx.)
		Frame rate: Up to 30 frames per second
		Still image capture: 8 million pixels (with software enhancement)
		Built-in microphone

		Integration with other products.	<p>To Support full integration with CIM software: part identification and quality control applications</p> <p>To Support remote camera.</p> <p>To Support optical character recognition (OCR).</p> <p>To Support use of multiple cameras in the same vision application.</p>

S.No	Descriptions of Goods	Specification
1	Linear Motion Control System	Linear Servo Base Unit Rack Dimension [L x W x H] = 102 x 15 x 6.1 cm Cart Mass = 0.57 Kg Cart Weight Mass = 0.37 Kg Motor Nominal Voltage = 6 V Motor Maximum Continuous Current = 1 A Motor Maximum Speed = 6000. VPM Encoder Resolution = 4096 Count/Rev (i) 8 Channel-USB Data Acquisition device (ii) VoltPAQ-Amplifier QUARC- Control Software for MATLAB
2	Vibration Meter	Low frequency range (overall measurement) 10 Hz to 1,000 Hz High frequency range (CF+ measurement) 4,000 Hz to 20,000 Hz Severity levels Good, satisfactory, unsatisfactory, unacceptable Vibration limit 50 g peak (100 g peak-peak) A/D converter 16-bit Signal to noise ratio 80 dB Sampling rate Low frequency 20,000 Hz High frequency 80,000 Hz Real time clock backup Coin battery Sensor Sensitivity 100 mV g $\pm 10\%$ Measurement range 0.01 g to 50 g

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		Low frequency range (overall measurement)	10 Hz to 1,000 Hz
		High frequency range	4,000 Hz to 20,000 Hz
		Resolution	0.01 g
		Accuracy	At 100 Hz $\pm 5\%$ of measured value
		Amplitude Units	
		Acceleration	g, m/sec ²
		Velocity	in/sec, mm/sec
		Displacement	mils, mm
		Infrared Thermometer (Temperature Measurement)	
		Range	-20°C to 200°C (-4°F to 392°F)
		Accuracy	$\pm 2^\circ\text{C}$ (4°F)
		Focal length	Fixed, at ~3.8 cm (1.5 in)
		External sensor	
		Fluke supports but does not provide external sensors	
		Frequency range	10 Hz to 1,000 Hz
		Bias voltage (to supply power)	20 VDC to 22 VDC
		Bias current (to supply power)	Maximum 5 mA
		Firmware	
		External interfaces	USB 2.0 (full speed) communication
		Data capacity	Database on internal flash memory
		Upgrade	Through USB
		Memory	Up to 3,500 measurements
		Radiated Emission	
		Electrostatic discharge: burst	Standard EN 61000-4-2

		Electromagnetic interference	Standard EN 61000-4-3
		RE	Standard CISPR 11, Class A
		Environmental	
		Operating temperature	-20°C to 50°C (-4°F to 122°F)
		Storage temperature	-30°C to 80°C (-22°F to 176°F)
		Operating humidity	10% to 95% RH (non-condensing)
		Operating/storage altitude	Sea level to 3,048 meters (10,000 feet)
		IP rating	IP54
		Vibration limit	500 g peak
		Drop test	1 meter
		General Specifications	
		Battery type	AA (2) Lithium Iron Disulfide
		Battery life	250 measurements
		Size (L x W x H)	24.1 x 7.1 x 5.8 cm (9.5 x 2.8 x 2.3 in)
		Weight	0.40 kg (0.89 lb)
		Connectors	USB mini-B 7-pin, stereo audio output jack (3.5 mm Audio Plug), external sensor jack (SMB connector)
3	Ultrasonic Flow Meter	Measuring principle: Hybrid, user selectable ultrasonic Doppler or transit time via pipe mounted transducers <i>Condition of flow:</i> Full pipe within the minimum and maximum velocity specifications <i>Liquid types:</i> Virtually any acoustically conductive fluid <i>Transit time mode:</i> from 0% to 10% (0 to 100,000 ppm) particulate <i>Doppler mode:</i> from 0.02% to 15% (200 to 150,000 ppm) of 50 micron particulate <i>Nominal pipe sizes:</i> 0.5 inch - 100 inch (12.7 mm to 2540 mm) <i>Pipe materials:</i> Most metal and plastic pipes <i>Pipe liner materials:</i> Most plastic liners <i>Liquid velocity range:</i> 0.25 to 30 f/s (0.08 to 9 m/s)	

Flow Sensitivity: 0.001 ft/s (0.0003 m/s)

Accuracy:

Transit Time accuracy at nominal pipe sizes

5.0 seconds: $\pm 1\%$ of rate > 1 ft/s and ± 0.01 ft/s < 1 ft/s

1.0 seconds: $\pm 1\%$ of rate > 5 ft/s and ± 0.05 ft/s < 5 ft/s

0.5 seconds: $\pm 2\%$ of rate > 12 ft/s and ± 0.25 ft/s < 12 ft/s

Doppler accuracy at nominal pipe sizes

5.0 seconds: $\pm 2\%$ of rate > 5 ft/s and ± 0.10 ft/s < 5 ft/s, 1.0 seconds: $\pm 2\%$ of rate > 8 ft/s and ± 0.20 ft/s < 8 ft/s,

0.5 seconds: $\pm 2\%$ of rate > 12 ft/s and ± 0.25 ft/s < 12 ft/s

Ultrasonic Flow Meters Electronics & Interface

Power: 90-264 VAC 50/60Hz or 15-30 VDC @ 30 watts maximum

Display: 320 x 240 pixel QVGA backlit LCD, UV resistant.

Rate and total display: 10 digit maximum + exponent to E+32 (selectable decimal location)

Display languages: English, Spanish, French, or German selectable

Keypad: Five-button positive action tactile switch keypad

Security: Programmable master password and individual configuration passwords

Rate & flow units: Independently configurable rate and total display units in: US Gallons, ounces, barrels (US liquid), barrels (US oil), cubic feet, acre feet, Imperial (British) gallons, liter, cubic meter, or user defined "custom" units.

Display time units: Seconds, minutes, hours, or days (rate & total units are independent)

Display outputs

Update time: Selectable: 0.25, 0.50, 1.0 (default), 2.5, 5.0 seconds

Flow rate averaging: Selectable: 0.50, 1.0, 2.5, 5.0 (default), 10.0 seconds

Signal outputs

Analog: Isolated 4-20 mA output - fully configurable, invertible

Pulse: 0-1000 Hz Pulse output - fully configurable, invertible

Control/alarm outputs: Three independently configurable 10 amp Form C, NO/NC relays

Data Logging

Rate & total: Date/time stamped in FAT32 file format, easily imported into Excel

Settings: Trigger on time interval (1-999,999 sec), rate and/or total set-point values

Storage: Over 500,000 log events possible with included 32MB SD Card. 2,000 logs held in memory buffer downloadable using software.

Ultrasonic Flow Meters Mechanical

Enclosure: NEMA 4X (IP66), powder coated aluminum, stainless steel hardware

Dimensions: 11.00H x 8.60W x 5.00D inches (279H x 218W x 127D mm)

Weight: 9.5 lb. (4.3 kg)

Mounting: Wall, pipe (vertical or horizontal) or panel, Hardware included

Panel opening: 10.63H x 8.10W inches (270H x 206W mm)

Panel depth: rear: 2.78 inches (71 mm), *front:* 2.18 inches (55 mm)

Operating temperature: 14 to 140° F (-10 to 60° C)

Storage temperature: -40 to 158° F (-40 to 70° C)

Ultrasonic Flow Meters External Communications

Computer connection: RS-232, RS-485, USB, Ethernet (comm. software included)

SS Ultrasonic Flow Meters Clamp-On Transducers

Housing: NEMA 6P (IP67), Nickel plated aluminum, stainless steel hardware

Dimensions: 3.12H x 2.95W x 1.60D inches (79H x 75W x 41D mm)

Weight (excluding cable): 0.8 lb. (0.4 kg.) each

Cable (non-removable): Shielded coaxial RG/U 59, PVC jacket, Black, RoHS Compliant. Standard length: 10 ft. (3m)

Optional lengths available: 25 ft. (7m), 50 ft. (15m), 100 ft. (30m)

Fits Pipe Sizes 2.0 inch - 100 inch (63 mm to 2540 mm)

Pipe surface temp: -20 to 250° F (-34 to 121° C)

Plastic Ultrasonic Flow Meters Clamp-On Transducers

Housing: NEMA 6P (IP67), PVDF base with polypropylene cover

Dimensions: 3.12H x 2.95W x 1.60D inches (79H x 75W x 41D mm)

Weight (excluding cable): 0.8 lb. (0.4 kg.) each

Cable (non-removable): Shielded coaxial RG/U 59, PVC jacket, Black, RoHS Compliant. Standard length: 10 ft. (3m)

Optional lengths available: 25 ft. (7m), 50 ft. (15m), 100 ft. (30m)

Fits Pipe Sizes 0.5 inch - 2 inch (12.7 mm to 50.8 mm)

Pipe surface temp: -20 to 250° F (-34 to 121° C)

4	Vital Sign Simulator ProSIm 8 Vital Sign Simulator with SpO2 Test Module	<p>General Specifications</p> <p>Temperature Operating: 10 °C to 40 °C (50 °F to 104 °F) Storage: -20 °C to +60 °C (- 4 °F to 140 °F)</p> <p>Humidity 10 % to 90 % non-condensing</p> <p>Altitude 3,000 meters (9,843 ft)</p> <p>Dimensions (L x W x H) 14.5 cm x 30.2 cm x 8.6 cm (5.7 in x 11.9 in x 3.4 in)</p> <p>Display LCD color display</p> <p>Communication USB device upstream port Mini-B connector for control by a computer USB host controller port Type A, 5 V output, 0.5 A max load. Connector for keyboard, barcode reader, and printer Wireless IEEE 82.15.4 for control by a computer</p> <p>Power Lithium-ion rechargeable battery</p> <p>Battery Charger: 100 V to 240 V input, 15 V/2.0 A output. For best performance, the battery charger should be connected to a properly-grounded ac receptacle</p> <p>Battery Life 9 hours (minimum), 100 NIBP cycles typical</p> <p>Weight 1.87 kg (4.2 lb)</p> <p>Safety Standards IEC/EN61010-1 3rd Edition; Pollution degree 2 CAT None</p> <p>Certifications CE, CSA, C-TICK N10140 , RoHS</p> <p>Electromagnetic Compatibility (EMC) IEC 61326-1:2006</p>
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Detailed Specifications

Normal-Sinus-Rhythm Waveform

ECG Reference

The ECG amplitudes specified are for Lead II (calibration), from the baseline to the peak of the R wave. All other leads are proportional.

Normal Sinus Rhythm

12-lead configuration with independent outputs referenced to right leg (RL) Output to 10 Universal ECG Jacks, color-coded to AHA and IEC standards.

High-Level Output

0.2 V/mV \pm 5 % of the ECG amplitude setting available on a BNC connector.

Amplitude 0.05 mV to 0.5 mV (0.05 mV steps) 0.5 mV to 5 mV (0.25 mV steps)

Other leads are proportional to Lead II (reference lead) in percentage per:

Lead I: 70
Lead II: 100
Lead III: 30
Lead V1: 24
Lead V2: 48
Lead V3: 100
Lead V4: 120
Lead V5: 112
Lead V6: 80

Amplitude Accuracy

\pm (2 % of setting + 0.05 mV)

ECG Rate

10 BPM to 360 BPM in 1 BPM steps

Rate Accuracy

\pm 1 % of setting

ECG Waveform Selection

Adult (80 ms) or neonatal (40 ms) QRS duration

ST-Segment Elevation

Adult mode only. -0.8 mV to +0.8 mV (0.1 mV steps). Additional steps: + 0.05 mV and - 0.05 mV

Power-On Default

60 BPM, 1.0 mV, adult QRS and ST-segment elevation of 0 mV

Arrhythmia

		Pacer Pulse	Amplitude	0 (off), ± 2 , ± 4 , ± 6 , ± 8 , ± 10 , ± 12 , ± 14 , ± 16 , ± 18 , ± 20 , ± 50 , ± 100 , ± 200 , ± 500 , ± 700 mV for lead II (reference lead)
			Accuracy	Reference lead II: $\pm (5\% \text{ setting} + 0.2 \text{ mV})$ All other leads: $\pm (10\% \text{ setting} + 0.4 \text{ mV})$
		Pacer Pulse Width		0.1 ms, 0.2 ms, 0.5 ms, 1 ms, and 2 ms $\pm 5\%$
		Paced Arrhythmias		Atrial 80 BPM Asynchronous 75 BPM Demand with frequent sinus beats Demand with occasional sinus beats Atrio-ventricular sequential Noncapture (one time) Nonfunction
		Power-On Default		Amplitude 5 mV, width 1 ms, atrial waveform
		Arrhythmia		
		Baseline NSR		80 BPM
		PVC Focus		Left focus, standard timing (except where specified)
		Supraventricular Arrhythmia		Atrial fibrillation (coarse or fine); atrial flutter; sinus arrhythmia; missed beat (one time); atrial tachycardia; paroxysmal atrial tachycardia; nodal rhythm; and supraventricular tachycardia
		Premature Arrhythmia		Premature atrial contraction (PAC); premature nodal contraction (PNC); PVC1 left ventricular; PVC1 left ventricular, early; PVC1 left ventricular, R on T; PVC2 right ventricular; PVC2 right ventricular, early; PVC2 right ventricular, R on T; and multifocal PVCs
		Ventricular Arrhythmia		PVCs 6, 12, or 24 per minute; frequent multifocal PVCs; bigeminy; trigeminy; multiple PVCs (one-time run of 2, 5, or 11 PVCs); mono-ventricular tachycardia (120 to 300 BPM in 5 BPM steps); poly-ventricular tachycardia (5 types); ventricular fibrillation (coarse or fine); and asystole
		Conduction Defect		First-, second-, or third-degree heart block; and right- or left-bundle-branch block

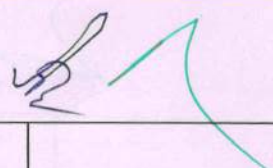
		Advanced Cardiac Life Support	Shockable pulseless arrest rhythms	Ventricular fibrillation (coarse), ventricular fibrillation (fine), unstable polymorphic ventricular tachycardia
			Non-shockable pulseless arrest rhythms	Asystole
			Symptomatic bradycardia	Sinus bradycardia (< 60 BPM) 2nd degree AV block, mobitz type I 2nd degree AV block, mobitz type II Complete/3rd degree AV block Right bundle branch block Left bundle branch block
			Symptomatic tachycardia: regular narrow-complex tachycardia (QRS < 0.12 seconds)	Sinus tachycardia > 150 BPM Supraventricular Tachycardia
			Symptomatic tachycardia: regular wide-complex tachycardias (QRS > 0.12 seconds)	Sinus tachycardia > 150 BPM Supraventricular Tachycardia SVT with aberrancy
			Irregular tachycardia	Atrial fibrillation (coarse and fine), atrial flutter, unstable monomorphic ventricular tachycardia (120 BPM to 300 BPM), torsade de pointes/polymorphic ventricular tachycardia (long QT interval)
		ECG Performance Testing		
		Amplitude (peak-to-peak) 0.05 mV to 0.5 mV (0.05 mV steps) 0.5 mV to 5 mV (0.25 mV steps) Other leads are proportional to Lead II	Lead I:	70
			Lead II:	100
			Lead III:	30
			Lead V1 through V6:	100

(reference lead) in percentage per:		
Pulse Wave	30 BPM, 60 BPM, with 60 ms pulse width	
Square Wave	0.125 Hz, 2 Hz, 2.5 Hz	
Triangle Wave	0.125 Hz, 2 Hz, 2.5 Hz	
Sine Wave	0.05 Hz, 0.5 Hz, 1, 2 Hz, 5 Hz, 10 Hz, 25 Hz, 30 Hz, 40 Hz, 50 Hz, 60 Hz, 100 Hz, and 150 Hz	
R-Wave Detection	Waveform	Triangular pulse
	Rate	30 BPM, 60 BPM, 80 BPM, 120 BPM, 200 BPM, and 250 BPM
	Width	8 ms to 20 ms in 2 ms steps, and 20 ms to 200 ms in 10 ms steps
	Width accuracy	± (1 % of setting + 1 ms)
QRS Detection	Widths	8 ms to 20 ms in 2 ms steps, and 20 ms to 200 ms in 10 ms steps
	Width accuracy	± (1 % of setting + 1 ms)
	Rate	30 BPM, 60 BPM, 80 BPM, 120 BPM, 200 BPM, and 250 BPM
	R-Wave up slope	0.875 amplitude, 0.4375 x width
	R-Wave down slope	Full amplitude, 0.5 x width
	S-Wave up slope	0.125 amplitude, 0.0625 x width
Tall T-Wave Rejection	Waveform	QT Interval 350 ms T-Wave width 180 ms T-Wave shape ½ sinewave
	Amplitude	0 % to 150 % reference lead amplitude in 10 % steps
	Rate	80 BPM
Rate Accuracy	± 1 % of setting	

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Amplitude Accuracy	± (2 % of setting + 0.05 mV)
ECG Artifact	
Type	50 Hz, 60 Hz, muscular, baseline wander, respiration
Size	25 %, 50 %, 100 % of the normal sinus R-Wave for each lead
Lead Select	All, RA, LL, LA, V1, V2, V3, V4, V5, V6
Fetal/Maternal ECG	
Fetal Heart Rate (fixed)	60 BPM to 240 BPM in 1 BPM steps
Fetal Heart Rate (IUP)	140 BPM at beginning, then varies with pressure
Intrauterine-Pressure Waveforms	Variable deceleration, early deceleration, late deceleration, and uniform acceleration
Wave Duration	90 seconds, bell-shaped pressure curve, from 0 mmHg to 90 mmHg and returning to 0
IUP Period	2 min, 3 min, or 5 minutes; and manual
Default Settings	FHR 120 BPM, uniform deceleration wave, manual
Invasive Blood Pressure	
Channels	2, each independently settable with identical parameters and are individually electrically isolated from all other signals
Input/Output Impedance	300 Ω - or ± 10 %
Exciter Input Range	2 to 16 V peak
Exciter-Input Frequency Range	DC to 5000 Hz
Transducer Sensitivity	5 (default) or 40 μV/V/mmHg
Pressure Accuracy	± (1 % of setting + 1 mmHg) accuracy guaranteed for dc excitation only
Static Pressure	- 10 to + 300 mmHg in 1 mmHg steps


		Pressure Units	mmHg or Kpa
		Dynamic Waveforms	Arterial (120/80) Radial artery (120/80) Left ventricle (120/00) Types (default pressures) Right ventricle (25/00) Pulmonary artery (25/10) Pulmonary-artery wedge (10/2) Right atrium (central venous or CVP) (15/10) Pressure variability Systolic and diastolic pressures are independently variable in 1 mmHg steps
		Swan-Ganz Sequence	Right atrium, right ventricle (RV), pulmonary artery (PA), pulmonary artery wedge (PAW)
		Cardiac Catheterization	Chambers Aortic, pulmonary valve, and mitral valve
		Respiration Artifact	Arterial, radial artery, and left ventricle 5 % to 10 % multiplication Other 5 mmHg or 10 mmHg
		BP Output	Circular DIN 5-Pin
		Power-On Default	0 mmHg
		Respiration	
		Rate	0 (OFF), 10 BrPM to 150 BrPM in 1 BrPM steps
		Waves	Normal or ventilated
		Ratio	Normal 1:1, 1:2, 1:3, 1:4, 1:5
		(inspiration:expiration)	Ventilated 1:1
		Impedance Variations (? Ω)	0.00 Ω to 1.00 Ω in 0.05 Ω steps and 1 Ω to 5 Ω in 0.25 Ω steps
		Accuracy Delta	\pm (3 % of setting + 0.05 Ω)
		Baseline	500 Ω , 1000 Ω (default), 1500 Ω , 2000 Ω , Leads I, II, III
		Accuracy Baseline	\pm 5 %



		Respiration Lead	LA or LL (default)
		Apnea Selection	12 sec, 22 sec, or 32 seconds (one-time events), or continuous (Apnea ON = respiration OFF)
		Power-On Default	20 BrPM, delta 1.0 Ω
		Temperature	
		Temperature	30 °C to 42.0 °C in 0.5 °C steps
		Accuracy	± 0.4 °C
		Compatibility	Yellow Springs, Inc. (YSI) Series 400 and 700
		Output	Circular DIN 4-Pin
		Cardiac Output	
		Catheter Type	Baxter Edwards, 93a-131-7f
		Calibration Coefficient	0.542 (0 °C injectate), 0.595 (24 °C injectate)
		Blood Temperature	36 °C (98.6 °F) to 38 °C (100.4 °F) ± 2 % in 1 °C steps
		Injectate Volume	10 cc
		Injectate Temperature	0 °C or 24 °C
		Cardiac Output	2.5, 5, 10 liters per minute ± 7.5 %
		Faulty-Injectate Curve	Waveform for simulation available
		Left-To-Right-Shunt Curve	Waveform for simulation available
		Calibrated Pulse	1.5 ° for 1 second
		Connector	Circular DIN 7 pin
		Power-On Default	5 liters per minute, 0 °C injectate, 37 °C blood temperature
		Non-Invasive Blood Pressure	
		Pressure Units	mmHg or kPa
		Manometer (Pressure Meter)	Range 10 mmHg to 400 mmHg Resolution 0.1 mmHg

		Accuracy	± (0.5 % reading + 0.5 mmHg)	
	Pressure Source	Target pressure range	20 mmHg to 400 mmHg	
		Resolution	1 mmHg	
	NIBP Simulations	Pulse	2 mmHg max into 500 ml NIBP system	
		Volume of air moved	1.25 ml max	
			Adult: 60/30 (40), 80/50 (60); 100/65 (77); 120/80 (93); 150/100 (117); and 200/150 (167) and 255/195 (215)	
		Simulations (systolic/diastolic [MAP])	Neonatal: 35/15 (22); 60/30 (40); 80/50 (60); 100/65 (77); 120/80 (93) and 150/100	
			Pressure variability: systolic and diastolic pressures are variable by 1 mmHg	
		Repeatability	Within ± 2 mmHg (at maximal pulse size independent of device under test)	
		Synchronization: normal Sinus heart rates: 30 BPM to 240 BPM	Maximum rate at 1 ml: 240 BPM achievable with pulses up to 1 ml	
			Maximum rate at 1.25 ml: 180 BPM	
	Synchronization: Arrhythmias	Premature atrial contraction (PAC), premature ventricular contraction (PVC), atrial fibrillation, and missed beat		
	Leak Test	Target pressure	20 to 400 mmHg	
		Elapse time	0:30 to 5:00 minutes: seconds in 30 second steps	
		Leakage rate	0 mmHg/minute to 200 mmHg/minute	
Pressure Relief Test Range	100 to 400 mmHg			
SpO2 Test (Optional)				
% O2	Range	30 % to 100 %		
	Resolution	1 %		

		% O2 Accuracy	With oximeter manufacturer's R-curve	Saturation within UUT specific range: \pm (1 count + specified accuracy of the UUT) Saturation outside UUT specific range: monotonic with unspecified accuracy
			With Fluke Biomedical R-curves	91 % to 100 % \pm (3 counts + specified accuracy of the UUT) 81 % to 90 % \pm (5 counts + specified accuracy of the UUT) 71 % to 80 % \pm (7 counts + specified accuracy of the UUT) Below 7 % monotonic with unspecified accuracy
		Heart Rate	30 BPM to 300 BPM in 1 BPM steps. SpO2 test is synchronized with ECG rate delayed by 150 ms, accuracy \pm 1% of setting	
			Range	0 ppm to 300.00 ppm
		Transmission: ratio of detector current to LED current, expressed in parts per million (ppm)	Resolution	0.01 ppm
			Accuracy	+ 50 %/- 30 % for compatible monitors, unspecified for others. Selected by finger size and color: dark, thick finger, medium finger, light, thin finger, neonatal foot. The full range and resolution are available in the engineering mode
		Pulse Amplitude	Range	0 % to 20.00 %
			Resolution	0.01 %
		Artifact	Respiration	Range: 0 % to 5 % of transmission Resolution: 1 % Rate: all ProSim respiration simulation settings
			Ambient light	Range: 0 to 5X transmitted light Resolution: 1X Frequency: DC, 50 Hz, 60 Hz, and 1 kHz to 10 kHz in 1 kHz steps



9	Integrated Servo motor driver unit	NI MID-7684 (or equivalent) 4 Axis stepper motor driver with power unit, 2phase hybrid stepper, compatible with NI motion controller card 7344/UMI7764 LabVIEW 8.5 and higher, necessary accessories, software and manuals
10	Ball Screw based Linear Motion Control Test bench	Linear Motion Control System Maximum Mobility 1 mtr AC/DC Servo Control System with PLC and HMI fixed on Stainless steel bench (May be allowed to develop indigeniously in lab)
11	Digital Storage Oscilloscope	4 channel digital storage oscilloscope
12	Dual Power Supply	Variable power supply 0-30 V DC Current maximum 5 Amp With digital display system

S.No	Descriptions of Goods	Specification
1	Multi-channel Machinery Health Monitoring System	<ul style="list-style-type: none"> ✓ Should have over 1, 00,000FFTline resolution (without true zoom) ✓ Weight should be less than 1.2 Kg. ✓ Should have large view area (4" x 3" screen minimum), VGA Color, TFT/ LCD type with high resolution (640x480 pixels), back light and contrast adjustment arrangement suitable for clear view at bright day light and night conditions. ✓ Should have two dedicated analog channel for vibration measurement, one for Temperature measurement, one for RPM measurement and one for communication between instrument and PC/Laptop . ✓ Should have minimum True Two simultaneous measurement channels (Individual channels should function separately, i.e., two different operations can be carried out on individual channels, viz. FFT and Time Signal analysis, simultaneously with different frequency settings etc.) ✓ Frequency range - 0.5Hz to 40 KHz. ✓ Sampling rate :\leq 131 KHz per channel. ✓ Should have the capability to measure surface temperature and necessary hardware to be quoted separately ✓ Signal: Capable to take measurements from ICP & Current line Drive Accelerometers . ✓ Should work both as data collector (Overall Vibration in displacement, velocity and acceleration in rms, 0 to peak, peak to peak) and analyzer (FFT, time signal analysis, phase measurement, visual inspection, orbit analysis) ✓ Should be supplied with tandem piezo-electric accelerometer to measure both vibration and shock pulse from the same accelerometer ✓ Instrument should measure Crest Factor to give us a quick idea of how much impacting is occurring in a waveform. Impacting is often associated with roller bearing wear, cavitation and gear tooth wear. ✓ Should have flexibility to perform 1 and 2 plane in-situ dynamic balancing facility with trial & corrective mass. ✓ Should have Filtered & Unfiltered Orbit Analysis Module. ✓ Instrument should measure Shock Pulse for monitoring the condition of Antifriction bearings and Pump Cavitation and gear tooth wear ✓ Should have Bump Test with Negative Averaging for finding out the Natural Frequency in both stop and running condition ✓ Should have Cross channel phase analysis, coast up & coast down analysis (Resonance test) with Shaft Rest Position facilities . ✓ Should have Envelope analysis for early detection of faults in rolling element bearings along with Cepstrum Analysis for early detection of faults especially in gearboxes• ✓ Software contain data base for different fault frequencies (bearing frequency, blade pass frequency, gear mesh frequency etc.) ✓ Should have Alarm display to ISO 10816-3 standards, with in-built LEOs for alarm status indication on field . ✓ Should have the Memory of at least 2GB and should be extended up to 8GB.



- ✓ Should have Icon display for each type of measurement.
- ✓ Should have Graphical machine scan feature (Technician should be guided by the machine picture on screen of instrument with arrow blinking at the measurement location) .
- ✓ Should have the facility for recording the time waveform data, etc. For minimum upto 100 hrs on continuous basis
- ✓ Should have the facility to connect with Ethernet cable to connect the instrument to network or PC – allows presentations and training (Ethernet cable shall be quoted as an option)
- ✓ Should have the facility to connect with Tri-axial Sensor for measuring the Vibration in three direction (Tri-axial sensor along with its cable adapter shall be quoted as an option.
- ✓ Should have the facility to connect with Audio Headset to listen to the machines and in particular, roller bearings of the characteristic noises that indicate damage (Audio, Headset along with its cable adapter shall be quoted as an option).
- ✓ Instrument should be supplied with ICP cable with TNG/BNG connector to connect the same to ICP microphone for Acoustic Analysis such as time waveform, FFT Analysis and Octave Analysis of the acoustic signal (Not required to quote an ICP microphone)
- ✓ History of last 10 reading .
- ✓ **Software**
 - Program Measurement task and routes
 - Evaluate and display result.
 - Govern all databases -Microsoft access
 - Standard window copy paste functionality.
 - Drag and Drop option feature.
 - Complete machine setup can be done on same window.
 - Download templates into the instrument.
 - Support multitasking feature.
 - Upload data Via multimode import
 - Multi view (Display multiple diagram in single window, combine any task with machine train, thus simplify data comparison)
 - Technical papers, oil reports, IR image can be attached to specific machine.
 - Trends preview, band analysis, waterfall display, frequency markers and various cursors.
 - Software shall be supplied with minimum 04pc licenses to upload software in additional PCs for successful operation. Software should run without the use of hard key / Dongle.
 - Should have data transfer through USB, serial jacks for direct connection for computer or Ethernet for companies' network.
 - Software should have gear box editor module for gear box analysis and should allow to create new gear box for customized analysis.
 - Software should have machine status view features enable to view the complete condition of machine in a glance.**Up gradation should be done free of cost**

2	Multi-Process Welding set of 400A capacity (Digital)	GMAW (MIG), FCAW (Flux-Cored), SMAW (Stick), and GTAW (TIG) welding, as well as ACAG (Arc Gouging). <i>Note: Preference will given to equipment / power sources based on INVERTER TECHNOLOGY.</i>
3	Plasma CNC and Portable Oxy Fuel Profile cutting machine	To cut 50 mm thickness, Cutting length: 3000 mm and Cutting width 1500 mm with 1 Nos. Oxy-fuel torch. Plasma Power Source
4	Current Probe -500 Amps compatible with Digital Storage Oscilloscope	Digital Oscilloscope 200 M Hz band width, 4 GS/s sample rate per channel, if-channel Current Probe -500 Amps 1. System should be 200MHz & with upgradable bandwidth facility. 2. System should be 4 channel & with 4GS/s support 3. System should have 10 Mpts memory per channel 4. Color Display 10.1" with advanced system control facility for complex problems through screen touch function. 5. System should have field software upgradable & hardware options. 6. System should be capable of measuring 500 Amp current. 7. Data search should support Hardware trigger, Frequency Trigger, Measured parameters based & non-monotonic edges. 8. System should have data logger facility with in-built hard disk & micro SD card. 9. System should have interactive data tables with touch access facility & easy documentations with history mode. 10. System should have offline measurement facility with cursors along with measurement parameters, zooming and maths functions. 11. System Basic connectivity Ethernet Port, Removable Storage, USB Host Ports 4total- front panel USB Ports 2 & One USB TMC port, System remote control via windows as & through systems remote command sets. 12. Warranty three years standard. 13. Other: Standard Accessories, User manual, Calibration Certificate, Power cord, Product Technical compliance statement should be submit.
5	Plasma Welding Machine of 300 Amps	Digital signal Inverter welding machine, DC. water-cooled. Plasma welding and brazing, Synergic: Transport cart for power source, cooling unit and gas cylinder Plasma Setting range for welding current 5 A - 300 A Pilot arc current 5 A - 25 A Open circuit voltage 90 V Protection classification IP 23 Insulation class/PF(cosphi) H/0.99 Standards IEC 60 974- 1; -3; -10 / CE / S-Safety sign / EMC class A
6	ELECTRODE MANUFACTURING PLANT	Capacity: 0.50/1.0 tonnes The plant must comprise of the standard components as mentioned below:

		Sieve Shaker :1 Dry Mixer :1 Wet Mixer :1 Caking Machine :1 Extruder :1 Wire Spool Stand :2 Wire Cutting Machine :1 Wire Stand :2 De coater :1 Conveyer :1 Furnace/Oven :1 Furnace Stands :100 Furnace Trolleys :2 Packaging Machine :1 Eccentricity testing microscope :1 Name printing machine :1
7	SMAW POWER SOURCE (400 AMPS)	<p>SMAW Power Source, Digital Inverter technology based, 400A maximum current.</p> <p>Additional features: Continuously adjustable welding current, Digital control, Continuously adjustable hotstart, Arc Force Control, An anti-stick device prevents the electrodes burning-out if the tips stick, Ignition program for basic electrodes, Over temperature indicator, thermostat-controlled fan, Generator-compatible, Spatter-free ignition, Welds rutile, Basic and cellulose electrodes up to 5 mm.</p>
8	Ferritescope	<p>Non-destructive measurement of the ferrite content in a range of 0.1 to 110 FN or 0.1 to 80% Fein austenitic and duplex steel.</p> <p>Simple measurement, even for complex specimen geometry.</p> <p>Battery or line operation.</p> <p>RS232 interface for data transfer to PC or printer.</p> <p>Automatic measurement acceptance at probe contact or with external start. Acoustical signal at measurement acceptance. Statistical evaluation of test series and display of min., max. & mean value, number of measurements, standard deviation as well as date and time.</p> <p>Outlier control for automatic elimination of erroneous measurements</p> <p>Input of specification limits.</p> <p>Free-running display with additional presentation of the measurement as analog bar between selected specification limits. Memory capacity for max. 10,000 measurements in 1,000 blocks in up to 100 applications.</p> <p>Fixed or free block size selection.</p> <p>Measurement units selectable between WRC-FN and %Fe.</p> <p>No influence of the electrical conductivity of the specimen.</p> <p>Only one calibration required for the entire practically relevant measurement range from 0.1 to about 90 FN.</p>

		<p>Measurement accuracy according to ANSI/ AWS A4 .2M/ A4.2: 1997 standards. Calibration with standards traceable to TWI secondary standards or with customer-specific standards. The FERITSCOPE should be suitable for measurements according to the Basler Standard or according to DIN 32514-1 with measurement probe and printer, protective cover, case, and operator manual and Calibration standard sets.</p> <p>Accessories NiCd battery, Charger for NiCd battery, Line adapter (220VAC input), Support stand for portable instrument, Printer paper for printer, Interface connecting set, PC software for transferring data from instrument to Excelspreadsheet, PC software for transferring data from instrument to Access database.</p>
9	Computer systems (Qty 15)	<ul style="list-style-type: none"> • Intel core i7 Configuration (Commercial Series) • CPU: Intel Core i7-4770, 3.4 GHz, 8 MB Cache or its higher version. • Chipset: Intel Q8 series. • Bus Architecture: 3 PCI (PCI/ PCI Express) or more. • Memory: 4 GB 1600 MHz DDR3 RAM with 32 GB Expandability. • Hard Disk Drive: 500 GB 7200 rpm or higher. • Monitor: 47 cm (18.5 inch) larger LED/ TFT Digital Colour Monitor TCO- 05 certified. • Keyboard: 104 keys . • Mouse: Optical with USB interface. • Bays: 2 Nos. or above. • Ports: 6 USB Ports or more (at least 2 USB with 3.0), 1 Display port/ VGA port, audio ports for microphone and headphone in front. • Cabinet : Tower/Mini Tower • DVD ROM Drive: 8X or better DVD RW Drive. • Networking facility: 10/100/1000 on board integrated Network Port with remote booting facility remote system installation, remote wake up, TPM enabled 1.2 chip using any standard management software. • Operating System: Windows 8 Professional or higher preloaded, as specified, with Media and Documentation and Certificate of Authenticity. • OS Certifications: Windows 8 Pro. OS. • Power Management: Screen Blanking, Hard Disk and System Idle Mode in Power On, Set up Password, Power supply SMPS Surge protected. • Preloaded Antivirus: Microsoft Security Essentials Software <p>Additionally,</p> <ul style="list-style-type: none"> • Additional Memory: 4 GB 1600 MHz DDR3 RAM.

		<ul style="list-style-type: none"> Additional Hard Disk Drive: 500 GB 7200 rpm or higher. With wireless card for LAN connection with wireless LAN router/switch.
9.1	Peripheral Devices	<ul style="list-style-type: none"> Wireless LAN Router/Switch with at least 12-16 ports (01 Qty) UPS – 600 to 800 VA 1 hour (10 Qty) EB-1935 with Epson WiFi Dongle Multimedia Projector with wireless connectivity between PC and Projector, Storage media port and wireless LAN connectivity Resolution: 1024 X 768 XGA, ANSI Lumen: 4000 (01 Qty) HP Laser Printer: HP LaserJet Pro MFP M226dn/dw for Print, scan, copy, fax, eprint
10	1000 BTU AHU Air Handling Unit Trainer with lab view analysis	<p>AIR HANDLING TRAINER</p> <p>(1) Blower</p> <p>a) Power: 220 ~ 24, AC 50/60Hz(0.25/0.26A),</p> <p>b) Size: 222mm x 60mm</p> <p>c) Airflow: 680 - 765m³/hr, 400 - 450CFM,</p> <p>d) impeller: PBT UL94V-0 Reinforced Plastic</p> <p>(2) Intake air conditioning duct: 8t Acrylic transparent, L250mmx W1750mmx H250mm</p> <p>(3) Exhaust air conditioning duct: 8t Acrylic transparent, L150mm x W1330mm x H150mm</p> <p>(4) Damper1 : 8t Acrylic transparent, 4steps rack and pinion</p> <p>1) Ratio of Opening and Shutting:(01 00%), (250x250x50mm, 1EA)</p> <p>(5) Damper2 : 8t Acrylic transparent, 3steps rack and pinion.</p> <p>1) Ratio of Opening and Shutting:(0-100%), (150x150x95mm, 2EA)</p> <p>(6) Damper3: 8t Acrylic transparent, 3steps rack and pinion.</p> <p>1) Ratio of Opening and Shutting:(0-100%), (150x150x95mm, 1EA)</p> <p>(7) Chamber: 8t Acrylic transparent, L600mmxW600mmxH685mm</p> <p>(8) Pump: AC 220V 60Hz, 30W</p> <p>(9) Water Tank: 8t Acrylic transparent, L350mmxW350mmxH320mm</p> <p>(10) Drain stop VN : 1EA</p> <p>(11) Nozzle: 30<p,250mm, Spray type</p> <p>(12) Compressor: 3/4HP, R-22, single 220V, Control Box</p> <p>(13) Condenser and fan motor: 3/4HP, air cooling, single 220V, 60Hz, 16W</p>

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| | <p>(14) Nipple: 1EA at each of high and low pressure</p> <p>(15) Expansion VN: Manual type, Range (1/2-3/2 tons), Temperature °F(-10°C)</p> <p>(16) Solenoid VN: %" Welding type 4EA</p> <p>(17) Filter dryer: %"Welding type 1EA</p> <p>(18) Pressure gages: 1EA each of high and low pressure</p> <p>(19) Sight glass: Welding type 1EA</p> <p>(20) Filter 1,2 : Nonwoven, L225mmx W225mmx H10mm</p> <p>(21) Receiver: Cylinder type, Include a Service VN</p> <p>1) 3/4 Hp, 22kgf/cm²G, Pressure test(33kgf/cm²G)</p> <p>2) Leak pressure(22kgf/cm²G), Down to 750, 90<p,190mm, 265mm, 140mm</p> <p>(22) Accumulator: 1HP, single intake, VERTICAL TYPE</p> <p>(23) Pre-heater: Electric heater, M-type, pin-type 1kW, AC 220vx1kw, 860kcal/h</p> <p>(24) Re-heater: Electric heater, M-type, pin-type 1kW, AC 220vx 1kw, 860kcal/h</p> <p>(25) Pre-cooler: Pin-tube air cooling type, surface 1.5m', pin pitch 2.5mm, tube 3/8"x 7step x 3row x 165EL</p> <p>(26) Re-cooler: Pin-tube air cooling type, surface 1.5m', pin pitch 2.5mm, tube 3/8"x 7step x 3row x 165EL</p> <p>(27) Water heater: 1<px 220V x 1.5kW</p> <p>(28) Hygrometer: 12VIDC, Detecting range: 20 - 90% RH,</p> <p>1) Output range: 4 - 20mA, Sensor type: Resistance, Accuracy <± 3%</p> <p>(29) Thermometer: 5<p,170mm, 9EA</p> <p>(2) THERMO METER MODULE</p> <p>1) Electronic Digital Humidity & De-humidity controller (ACIDC 12-15V, 0 -100%) : 1EA</p> <p>2) Electronic Digital Temperature Meter (220V AC50 - 60Hz, -40.0 - 100C : 3EA</p> <p>3) Electronic Digital Temperature controller (ACIDC 12-15V, Heating or cooling, -40.0 - 100C) : 8EA</p> <p>4) Terminal: 20EA</p> <p>(3) POWER MODULE</p> <p>1) S.M.P.S (24V 3.1A): 1EA</p> <p>2) N.F.B (15A, Single): 1EA</p> <p>3) VOLT METER (DC 30V Full scale) : 1EA</p> <p>4) AM METER (DC 3A Full scale) : 1EA</p> <p>5) Toggle Switch: 1EA</p> |
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		6) Fuse & Holder (20A) : 1EA 7) AC Lamp (220V) : 1EA 8) Terminal: 8EA (4) TERMINAL BASE MODULE 1) Magnet Contact (DC24V), 13A, 5a, 2b : 1EA 2) Relay (DC24V, 8Pin) : 11EA 3) Relay Base: 11EA 4) Fan Speed Controller :2EA 5) Terminal: 38EA (5) MIC, RELAY MODULE 1) Magnet Contact (DC24V), 13A, 5a, 2b : 1EA 2) Relay Base (8Pin) : 2EA 3) Relay (DC24V, 8Pin) : 2EA 4) Terminal: 32EA 2.NI DAQ INSTRUMENTS - NI cDAQ 9172 Chassis (8 Modules) - NI 9205 32-Ch ± 200 mV to ± 10 V, 16-Bit, 250 kS/s Analog Input Module - NI 9211 4-Channel, 14 S/s, 24-Bit, ± 80 mV Thermocouple Input Module - NI9472& NI 9901 Desktop Mounting kit
11	<i>aspenONE for universities</i> Exchanger design and rating suite with all the modules	<i>aspenONE for universities</i> Exchanger design and rating suite with all the modules license term : Ten years
12	Data Acquisition System (Qty 02)	1. Data Acquisition switching unit a) Resolution: 6 ½ X digits DMM b) Types of Input: Thermocouple (J,K,T Type Thermocouple), RTD Temperature measurements, ac voltage, dc voltage, ac current, dc current, frequency, periods, 2 and 4 Wire resistance. c) Channel Scan rate: 200 Channels per second. d) Scaling and alarms for each channel e) Data Logging software

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| | <ul style="list-style-type: none">f) Three slot card cageg) 1Gbit LAN and USB2.0 for connectivity to the PCh) USBMemory interface for data transfer and storage |
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2. Multiplexer Cards

- a) 20 channels
- b) 2 wire armature with built in cold junction reference
- c) Speed: 60 Channels per second

3. Laptop Specifications:

- a) CPU: intel i5
- b) RAM: 4GB DDR3 RAM
- c) HDD: 540GB with DVD RW Drive
- d) LCD: 11.6" TFT
- e) Operating System: *Original* Windows 8

13	T Solar PV Grid-Tied Training System	<p>Components</p> <p>Power generating unit</p> <p>Solar PV Grid tied Inverter</p> <p>Virtual grid</p> <p>Measurement Unit</p> <p>Accessories</p> <p>Salient features:</p> <ul style="list-style-type: none"> • Virtual grid • Automatic Power Source priority • Active reactive and apparent flow tracking • Net Metering 	<p>Sub Component</p> <p>Solar PV Module</p> <p>Number of Modules</p> <p>Type</p> <p>Total Power</p> <p>No. of Grid tied Inverter</p> <p>MPPvoltage Range</p> <p>Rated grid voltage</p> <p>Maximum Output current</p> <p>Rated Power</p> <p>Rated frequency</p> <p>Feeding phases</p> <p>Nominal Output Voltage</p> <p>Frequency</p> <p>Capacitor Bank</p> <p>Transmission line Inductance</p> <p>Isolated Sensor</p> <p>AC Voltage Sensor</p> <p>AC Current Sensor</p> <p>Power Analyzer-2</p> <p>Ammeter-AC</p> <p>Manual</p>	<p>Specification</p> <p>2</p> <p>Poly-crystalline</p> <p>500 W_p</p> <p>1</p> <p>45V...100V</p> <p>230V</p> <p>2.5A</p> <p>300 W</p> <p>50Hz</p> <p>Single phase</p> <p>230V AC</p> <p>50 Hz</p>
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S.No	Descriptions of Goods	Specification
1	HPLC	<p data-bbox="584 266 1995 326">Manufacturer's original leaflet must be attached highlighting the required specifications with a tick mark. Mere recommendation by the supplier will not be entertained.</p> <p data-bbox="584 367 875 394">HPLC Pump system:</p> <p data-bbox="584 435 1554 565"> Quaternary Gradient Pump, dual piston in series with floating piston Flow Rate Range : 200 µl to 10 ml/min. in 0.001 increments Operating Pressure : 7000 Psi or on higher side Flow rate accuracy : nearer to zero percent </p> <p data-bbox="584 605 1095 633">Safe leak handling with leak sensors</p> <p data-bbox="584 639 2092 699">System should be stackable, self contained module with solvent resistance material used in all area which may have contact with the mobile phase.</p> <p data-bbox="584 740 936 768">Online vacuum degasser</p> <p data-bbox="584 774 1995 834"> Flow rate Precision : As nearer to zero% as possible at smaller running times around 10-15min Pressure ripple : lesser than 1% or well below that. </p> <p data-bbox="584 907 958 935">Multi-wavelength detector:</p> <p data-bbox="584 976 1563 1068"> Wavelength range : 190-900 nm or beyond that Wavelength Accuracy : $\pm 1\text{nm}$ and may have at least 3 signals. Should be least noise creative $<< 1 \times 10^{-5}$ AU. </p> <p data-bbox="584 1109 775 1136">Autosampler:</p> <ul data-bbox="584 1177 2018 1284" style="list-style-type: none"> • Should have sample capacity of 100 x 2 ml vials in 1tray, 40 x 2 ml vials in ½ tray, 15 x 6 ml vials in 1/2 tray • carryover of nearer to zero% with temperature control in most possible broader range (around 0-50°C) • Should have injection volume: 0.1-100 µl, injection range, in 0.1 µl. <p data-bbox="584 1357 786 1385">Column Oven:</p> <ul data-bbox="584 1425 1845 1453" style="list-style-type: none"> • Peltier cooling and heating 150°C below ambient to 85°C (accuracy ± 0.1 °C or closest to that)

		<ul style="list-style-type: none">Should have provision to upgrade with a column switching valve																								
2	UV Fabric Analyser	<p>The Ultraviolet Transmittance Analyzer should be designed for measuring the UV transmission of dry textiles/fabrics as a means of determining their ultraviolet protection factor. The instrument should operate by measuring the diffuse transmittance of a fabric sample as a function of wavelength in the ultraviolet spectrum. The measurement instrument should satisfy all the requirements of following standards.</p> <ul style="list-style-type: none">AS/NZ 4399:19961.EN 13758-1:2002AATCCTM 183-2004.GB/T18830:2009Japan Garment Association StandardCustomer Defined Method <p><u>Performance Specifications Value</u></p> <table><tr><td>• Spectral Range</td><td>: 250 - 450 nm</td></tr><tr><td>• Wavelength Accuracy,</td><td>: +/- 1.0 nm or better</td></tr><tr><td>• Lamp</td><td>: Xenon Flash lamp with continuous spectral distribution</td></tr><tr><td>• UV Dose per Measurement Cycle on sample</td><td>: < 0.2 J/cm2</td></tr><tr><td>• Transmittance Measurement Range</td><td>: 0 % - 100%</td></tr><tr><td>• Absorbance measurement Range</td><td>: 0 - 2.7 A or greater</td></tr><tr><td>• Dynamic Range (Absorbance)</td><td>: 0 - 2.7 AU or greater</td></tr><tr><td>• Data Interval</td><td>: 1 nm or better</td></tr><tr><td>• Measurement area at least 0.6 cm2</td><td></td></tr><tr><td>• Computer Interface USB 2.0 '</td><td></td></tr><tr><td>• Power requirement</td><td>: 110 - 120/220 - 240 VAC, 60/50 Hz</td></tr><tr><td>• Operating Requirements</td><td>: 0 - 50°C, 0%- 70% RH (non-condensing)</td></tr></table> <p><u>Instrument must have following key capabilities</u></p> <ul style="list-style-type: none">Fast measurement for samples to irT1proveefficiency; measurement time 5sec or lessAutomatic calculations of spectral transmittance, UPF, critical wavelength and UVA:UVB ratiosIn-house performance validation routine for the instrument/system	• Spectral Range	: 250 - 450 nm	• Wavelength Accuracy,	: +/- 1.0 nm or better	• Lamp	: Xenon Flash lamp with continuous spectral distribution	• UV Dose per Measurement Cycle on sample	: < 0.2 J/cm2	• Transmittance Measurement Range	: 0 % - 100%	• Absorbance measurement Range	: 0 - 2.7 A or greater	• Dynamic Range (Absorbance)	: 0 - 2.7 AU or greater	• Data Interval	: 1 nm or better	• Measurement area at least 0.6 cm2		• Computer Interface USB 2.0 '		• Power requirement	: 110 - 120/220 - 240 VAC, 60/50 Hz	• Operating Requirements	: 0 - 50°C, 0%- 70% RH (non-condensing)
• Spectral Range	: 250 - 450 nm																									
• Wavelength Accuracy,	: +/- 1.0 nm or better																									
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• Dynamic Range (Absorbance)	: 0 - 2.7 AU or greater																									
• Data Interval	: 1 nm or better																									
• Measurement area at least 0.6 cm2																										
• Computer Interface USB 2.0 '																										
• Power requirement	: 110 - 120/220 - 240 VAC, 60/50 Hz																									
• Operating Requirements	: 0 - 50°C, 0%- 70% RH (non-condensing)																									

	<ul style="list-style-type: none"> • Compact bench top footprint • Spectrometer or similar technology based system capable of displaying entire spectrum in UV range • light source must have continuous spectral distribution. • Wavelength accuracy to +1nm or better. • Dynamic range extension up to 2.7 AU or more • Auto flash capability for the lamp • The Instruments should provide a readily expandable platform to meet the evolving needs of the fabric manufacturing industry. • The software should guide the operator through the standard method step-by-step, saving all sample scans, statistical data and decision making parameters. It should record display spectral transmittance data as well. • USB Computer interface.
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Centralized Procurement at Institute level.

- Proposal for the purchase of Smart Boards to modernize classrooms like Smart boards for classrooms, Computers & peripherals etc, for enhancing technology enabled teaching-learning and extend benefit to students and faculty of the institutions.
- Proposal for the purchase of Furniture for PG labs and for the TEQIP Cell.
- Minor items including consumables such as laboratories & workshop supplies, stationary, office items etc. for the PG labs for individual departments as per the requirements.

Package No.	S.No	Descriptions of Works / Goods	Estimated Costs (Rs) in Lacs	Method of Procurement	Design / investigation completed / specification finalization (Date)	Estimate Sanctioned (Date and Value)	Preparation of BID document (Date)	Bank's No Objection to Bidding Documents (Date)	Bids		Contract Award (Date / Value)	Date of Completion of Contract
									Invitation of Bids	Opening of Bids		
SB/1501	01	Smart Boards (40Nos)	50.00	As per Norms	Annexure "SB - Fur"	July 2015	August 2015	-	September 2015		October 2015	Dec. 2015
Fur/1502	02	Furniture	15.00			July 2015	August 2015	-	September 2015		October 2015	Dec. 2015

Annexure "SB-Fur"

S.No.	Descriptions of Goods	Specification
1	Smart Boards	Interactive Whiteboard (IWB) with 3D Optical, Projection size upto 90 inches, multi touch interactive system, automatic as well as manual calculation, USB 2.0 interface, software support, 6'X4' magnetic white board 5'X4' green board, integrated document camera, low throw projector, 2800ANSI lumens, dual core / 2GB / 500 GB / No CD / DOS / Keyboard / Mouse, UPS 1KVA, 2.1 Speakers, One switch Operation.
2	Furniture	Class room bench / desk, lab tables equipped with electric power points and lab stools / Chairs for PG programmes.

Consultant Services for SubComponent 1.2

S.No	Activities	Description of Services	Estimated Cost (Rs)	Method of Selection @	TOR Finalization (Date)	Advertisement Date	*RFP final draft to be forwarded to the Bank (Date)**	No objection from Bank for RFP (Date)**	RFP issued (Date)	Proposal received date	Evaluation (Date)	No Objection by the Bank (Date)**	Contract Value & Date of award	Contract Completion (Date)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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Annexure "B"

Action plan for organising a Finishing School and for improving the academic performance of SC/ST/OBC/academically weak students

There has been an emphasis on the improvement of academic performance of the weak students through the Equity Action Plan (EAP) under TEQIP-II. It is therefore essential to identify the weak students, at first.

• Identification of Weak Students

The students who are securing 'E' or 'U' grades in 40-50 per cent of subjects or year back students will be considered 'weak students'. However, if timely steps are taken right at the beginning, then the worst performance of such students can be avoided to large extent.

Since the course coordinator is in a better position to identify weak students; therefore, the course coordinator should identify weak students on the basis of class attendance, class performance, ability of the student to solve assignment and tutorial problems, and performance in class tests.

The Faculty Counsellors appointed in the Institute Counselling Cell can also obtain meaningful information (as stated above) about the weak students through batch-wise appointed Students' Counsellors.

At the start of the new academic session, the academic section of the institute will provide information in the following format, about the probable weak students among the new entrants, based on their marks/ rank in the entrance test, or on the basis of marks percent in the qualifying marks (say who have just got minimum requisite marks).

S.No	Roll No	Name	Branch and year	Category	10+2 Marks (%)	All India Rank

• Appointment of Students' Mentors

The guidelines of the project emphasize on the appointment of 'Faculty Advisers' or 'Mentors' as one of the important student-centric strategies. Based on these guidelines, it is proposed that each faculty member (regular) may be allotted approximately 30 B. Tech. students for mentoring. There are about 3000 B. Tech. Students and 100 faculty members in the institute. The faculty members from applied sciences and humanities may be appointed as FAs only to the first year students. The faculty of respective departments may be appointed as FAs from second year onwards till the completion of course. The FAs appointed in the first year would pass on the record of weak students to the FAs appointed in the second year. The faculty adviser (FA) will give academic advice to the allotted students. In future, the faculty advisers would be allotted to the new entrants at the start of the first year of the students in the institute.

The course coordinator and the faculty counsellor will also provide information about weak students to the concerned faculty adviser or mentor as early as possible and would continue to provide updates at regular intervals (fortnightly) before their scheduled meeting day with FA. It is expected that the information about weak students should reach within one month from the start of the semester.

Each Faculty Adviser (FA) will obtain information about the past academic record of the allotted students, which is available in the respective departments from 3rd semester onwards, to identify weak students among allotted students by looking at their E or U Grades. The examination section would provide information in the above mentioned format to the respective Faculty Advisers who would be allotted first year students.

Further, FA will keep a track on the student's performance through periodic meetings that will usually be held fortnightly. Alternate Friday may be permanently fixed for these meetings. In the periodic meetings, the faculty adviser will also ask students about their progress i.e. class attendance, understanding of different

subjects, marks scored in tests, ability to solve assignment and tutorial problems. A special monitoring will be carried out for students from the disadvantaged sections of society (SC / ST / OBC) and women students.

The provision of including Faculty Adviser (FA) in the ERP system should also be made in such a way that FA, with the help of login id, can have access to the past record of allotted students and can also track the performance of allotted students' at any point of time.

- **Role of Nodal Officer (EAP) and Concerned HODs**

The respective faculty advisers would immediately provide information to the Nodal Officer (EAP) TEQIP. The Nodal Officer would consolidate information and classify into different subject groups. Accordingly, the concerned HOD would be requested to make arrangements for the conduct of special classes in the evening and on the weekends on the identified subjects with the help of internal and external resources persons. The resource persons may be given honorarium as per Institute's norms for the guest faculty.

- **Immediate Action Plan**

To begin with, during the current semester, it is proposed to allot faculty advisers to all the B. Tech. students with each faculty adviser having about 30 students. The Dean Academics/Associate Dean Academics (UG) may be requested to centrally allot and notify faculty advisors from the faculty of applied sciences and humanities departments on random basis for first year students, and through the respective HODs for second to final year students. The faculty advisers may call the first meeting with the allotted students in the third week of March, 2015 to identify weak students and their onward information in the following format for further action as per above stated process.

List of Weak Students

S.No	Roll No	Name	Branch and year	Category	Subject Code and Subject Name

The course coordinators after assessment should also send the list of weak students to their Faculty Advisers. When the inclusion of FAs in ERP system takes place, then FAs can have the direct information about the weak students.

The academic section should provide details of respective students in the following format to those Faculty Advisers who would be allotted first year students.

S.No	Roll No	Name	Branch and year	Category	10 +2 Marks (%)	All India Rank	SGPA in previous Semester	CGPA

The FAs of respective engineering departments can refer to examination records available in departments to obtain information about the subjects in which allotted students have performed poorly (E or U grades) so far.

- **Soft Skills Training Programme**

In the current teaching scheme for all B. Tech programmes, a provision has been made for an audit course on Soft Skills in the third year. However, difficulty is being faced in the search of appropriate faculty. The HOD Humanities and Management may be requested to appropriately re-draft proposal for the desired qualifications/experience and remuneration package, so that suitable people can be arranged for the training of the students. The reimbursement to the faculty may be made from the funds available under EAP. The educational bodies like British Council and Talent Sprint who have been associated with prestigious institutes like IITs for offering such programmes would also be consulted for specialized training, and their proposals would be considered on merit and appropriateness to our requirements.

- **Miscellaneous Matters**

It is also pertinent to mention here that institute arranges summer and winter contact courses, which are attended by most of the weak students. The honorarium paid to the faculty may be reimbursed from TEQIP funds under provisions for EAP and no fee may be charged from the students attending these courses.