

Sr. No.	Description with complete specification	Qty.
1.	<p><b>Master Unit Basic Electronics Trainer kit:</b> The trainer should be aesthetically designed injection moulded electronic desk (Master unit) carrying useful experiment resources Variable Power supplies / Status / Pulsar / Function Generator, DPMS etc. while the central slot will carry replaceable experiment panel secured in an ABS molded plastic sturdy enclosure, and has colorful screw less overlay showing circuit &amp; its connection tag numbers for easy connectivity, Connection should be through Sturdy 4 mm Banana Sockets &amp; Patch Cords, Set of Users Guide should be provided with each Unit.</p> <p><b>Built in Power Supply</b> DC Supply: 5V / 1A &amp; <math>\pm</math> 12V, 500 mA, 0 to 15V DC (Variable), 100 mA (Isolated), 0 to 30V DC (Variable), 100 mA (Isolated), High Volt DC - 15V to 220 V, 100mA, AC Supply : 12-0-12V AC,150 mA. Short circuit protected.</p> <p><b>Built in Function Generator</b> Output Waveform: Sine, Triangle &amp; TTL O/Ps, Output Frequency: 1 Hz to 1MHz in 6 ranges with amplitude &amp; frequency control pots, O/P Voltage 20 V p-p max.(Sin / TRG).</p>	02
2.	<p><b>Transistor Amplifier Experiment kit :</b> Differential amplifier, 2 stage R-C coupled amplifier, Transformer coupled amplifier, common source FET amplifier, common drain FET amplifier ( source Follower), Push pull amplifier, Complementary symmetry amplifier, Class D amplifier.</p>	02
3.	<p><b>Transistor Signal &amp; Feedback Amplifiers Experiment kit :</b>Current &amp; Voltage shunt feedback amplifier, Current &amp; Voltage series feedback amplifier, RF tuned amplifier/oscillator with AM/FM Facility, Class A amplifier, Class B amplifier, Class AB amplifier, Class C amplifier, Class D or switching amplifier, Pulse width Modulator.</p>	02
4.	<p><b>Operational Amplifier Circuit Experiment kit:</b> Inverting amplifier, Non - inverting amplifier, Summing amplifier, Difference amplifier, Integrator circuit, Differentiator circuit, Precision rectifier : Half wave &amp; full wave, Voltage to current converter, Current to voltage converter, Op-amp characteristics, Instrumentation amplifier, Schmitt trigger, Comparator, Sign Changer, Offset Null, Peak detector, Clipping circuit, Clamping circuits (DC restorer), Waveform Generator.</p>	02
5.	<p><b>Advance Operational Amplifier Experiment kit :</b> Low pass filter, High pass filter, Band pass filter, Band stop(Notch)filter, Wien Bridge oscillator, Phase Shift oscillator, Sample &amp; hold circuit, Log amplifier, Antilog amplifier, Voltage to frequency converter, Frequency to voltage convertor, Square Rooter</p>	02
6.	<p><b>Timer (555) &amp; Frequency (565) Experiment kit:</b> Using 555 : Timer (1 shot/Monostable), Free running (As table), Bis table. Applications of 555: Saw tooth generation, long duration timer, tachometer, missing pulse detector. Using PLL (IC565), VCO, Phase detector, Determination of Lock freq., Capture freq., &amp; freq. Multiplier / Synthesizer, FM demodulation (Using PLL).</p>	02

7.	<p><b>Component Trainer kit</b></p> <ul style="list-style-type: none"> <li>• On Board:- Power Supply 3.3 V, 5V,12Vs,</li> <li>• Power Indicator for on/off status,</li> <li>• Resistances- 1 k<math>\Omega</math> 1 watt (carbon),</li> <li>• 10k<math>\Omega</math> 1 watt (Carbon), 100k<math>\Omega</math> 1 watt (mfr)</li> <li>• 1 M ohm 1 watt (mfr), 1 5<math>\Omega</math>/5 watt</li> <li>• (wire wound), 100 ohm (ceramic)</li> <li>• 1 k<math>\Omega</math> (carbon Preset), 10 k<math>\Omega</math> (DAP Preset),</li> <li>• 1k<math>\Omega</math> (potention-meter), 10 k<math>\Omega</math> (10 turn pot),</li> <li>• Transistor-PNP 178, NPN 108, Capacitor-104 pf(ceramic), 10<math>\mu</math>f (Electrolytic), 100<math>\mu</math>f (Electrolytic) 26223k<math>\Omega</math> (polyster), Gang Capacitor, Diodes-4007, 4148, OA79, 3.9 v, Zener Diode,</li> </ul> <p>Led 5 mm, Inductor- 1 mh, Voltage Regulator- 1m317, 7805, 7812, IC's-555,741 Switches- SPDT, DPDT, 4 way (DIP switch), Relay-12v DC</p>	04
8.	<p><b>Digital Multi meter:</b> Digital multi meter DC</p> <p>Voltage:400mV/4V/40V/400V/1000V  AC Voltage :4V/40V/400V/750V  DC Current :400<math>\mu</math>A/4000<math>\mu</math>A/40mA/400mA/4A/10A  AC Current:400<math>\mu</math>A/4000<math>\mu</math>A/40mA/400mA/4A/10A  Resistance:400<math>\Omega</math>/4k<math>\Omega</math>/40k<math>\Omega</math>/400k<math>\Omega</math>/4M<math>\Omega</math>/40M<math>\Omega</math>  Capacitance:40nF/400nF/4<math>\mu</math>F/40<math>\mu</math>F/100<math>\mu</math>F  Frequency :10Hz-10MHz</p>	02
9.	<p><b>AM Receiver Trainer:</b> Superhetrodyne</p> <p>Frequency Range : 980 KHz to 2060 KHz, Intermediate Frequency : 455 KHz  Tuning : With variable capacitor (ganged), Dial marking on board, Receiving media : Telescopic antenna / Cable Detectors: 1) Diode detector (for DSB) 2) Product detector (for SSB)  Audio Output : Amplifier with speaker</p>	02
10.	<p><b>AM Transmitter/ Receiver Trainer:</b> Audio Oscillator : With adjustable Amplitude &amp; Frequency (300 Hz - 3.4 KHz), Audio Output : Amplifier with speaker, Modulators : Balanced Modulator with Band pass Filter (1 MHz) , On board audio jacks for Microphone and Earphone connection  On board Speaker for audio communication</p>	04
11.	<p><b>Optical Fiber Link (Analog/ Digital):</b> Transmitter: 2 nos. Fiber Optic LED having peak wavelength of emission 660 nm &amp; 950 nm, Receiver : Fiber Optic Photo-detector, Modulation Techniques: AM, FM, PWM, Analog Band Width : 350 KHz, Function Generator : 1 KHz Sine wave (Amplitude adjustable) ,1 KHz Square wave</p>	02
12.	<p><b>Delta Sigma modulator / demodulator:</b> Internal Signal Generator : Direct Digital Synthesizer, Types of Signal : Sine, Square, Triangle, Arbitrary Signals, Frequency : 500Hz, 1KHz, 2KHz, 3KHz, Selectable Sampling Frequencies, Selectable step size for Integrator</p>	04

13.	<b>Frequency Division Multiplexing Modulation/Demodulation kit:</b> Carrier Generator : Sine wave 100 KHz & 200 KHz, Modulating Input Frequency : Sine wave 200 Hz -10 KHz (variable), Audio Input Amplifier : Gain of 100 (approx.), Modulator / Demodulator : DSBSC, Audio Output Amplifier : Output Amplifier with a gain of 20	05
14.	<b>Pulse Position Modulation / Demodulation kit:</b> Sine wave : 1 KHz & 2 KHz (Gain adjustable), Square wave : 1KHz & 2 KHz, Low Pass Filter : 4 <sup>th</sup> order BW filter, Voice communication using dynamic microphone & speaker, AC Amplifier : With adjustable Gain Control	05
15.	<b>Phase Modulator Transmitter/ Receiver Trainer:</b> Super Heterodyne, Tuning Range : 88 MHz to 108 MHz, Inter Mediate Frequency: 10.7 MHz, Pilot Frequency : 19 KHz, Tuning : With variable capacitor (Gang) dial marking on board, Receiver Media : Telescopic Antenna, Amplifier : Class B Amplifier, Audio Output : (10 W +10 W) 20 W	05
16.	<b>Sampling and reconstruction kit:</b> Crystal Frequency : 8 MHz, Sampling Frequency : 20, 50, 80, 100, 200 & 400 KHz (switch selectable), On-board Generator : Synchronized 1 KHz sine wave (5 V ) pp, Duty cycle : 0 - 90% in Decade steps (switch selectable), Low Pass Filters : 2 & 4 order Butterworth filters	05
17.	<b>Time Division Multiplexing (Analog and Digital):</b> Input channels: 4 nos., Multiplexing :Time division multiplexing, Modulation : DSB / DSBSC PCM/ PAM modulation	05
18.	<b>FM Transmitter/ Receiver Trainer:</b> Super Heterodyne, Tuning Range : 88 MHz to 108 MHz, Inter Mediate Frequency: 10.7 MHz, Pilot Frequency : 19 KHz, Tuning : With variable capacitor (Gang) dial marking on board, Receiver Media : Telescopic Antenna, Amplifier : Class B Amplifier, Audio Output : (10 W +10 W) 20 W	05
19.	<b>Adaptive Delta Modulator / Demodulator:</b> Internal Signal Generator : Direct Digital Synthesizer, Types of Signal : Sine, Square, Triangle, Arbitrary Signals, Frequency : 500Hz, 1KHz, 2KHz, 3KHz, Selectable Sampling Frequencies, Selectable step size for Integrator	05
20.	<b>Multimedia projector with ceiling mount accessories and cables:</b> Resolution: 1024x768xGA: ANSI, Lumen: 4000, with wireless connectivity between PC and projector, remote control, ceiling mounting brackets, technology should be LCS, Horizontal and vertical image (Keystone)	01
21.	<b>FPGA Based Reconfigurable Radio Development system:</b> Based on Xilinx Zynq SOIC (Zed Board), Compatible with GNU Radio for SDR system development, 512 MB of SDRAM , 16 GB of QSPI Flash, 10/100/1000 Ethernet Interface, USB-UART Interface, Micro SD Card Interface, USB 2.0 4-Port HUB, FMC HPC Slot (VADJ of 1.8 V, 2.5 V, or 3.3 V), Software tunable across wide frequency range (70 MHz to 6.0 GHz) with a channel bandwidth of v<200 kHz to 56 MHz, Phase and frequency synchronization on both transmit and receive paths, 2 Tx / 2 Rx ports, External Reference Clock source can be connected, AGC, Quadrature calibration and DC offset calibration, NF: 2.5dB @1GHz, ADC: Continuous time sigma-delta, 640MSPS, Digital	01

	Filters: 128 complex taps, decimation between 2 and 48, Gain: 1dB step size, 80dB analog , range, 30dB digital range (post ADC scaling), Max input power 0dBm, Supports up to 2, direct conversion RF receive channels, Fully integrated synthesizers (including loop filter), Data path consists of digital filters, DAC and Modulators, Digital Filters: 128 complex taps, interpolation between 2 and 48, Gain: 0.25dB step size, 86dB range, DAC: 320MSPS, Max out power 7.5dBm @2.4 GHZ, System must be supplied with its own portable platform, System must be preloaded with linux operating system with GNU Radio, Laptop with latest processor, 500 Gb hard disk, 8 Gb RAM, , original, with life time antivirus, carrying bag etc. Printer should be laser printer with scanner.	
22.	<b>Illuminated magnifier: Lens:</b> Specially designed, distortion controlled high quality lens correctly sized for both eyed (bi-ocular) vision. Clear diameter 130 mm, 3.2D lens. Provides about 4 times area magnification. Working clearance below lens mount is 250 mm, and field seen can be up to 250 mm. Illumination: 22 watt standard circular fluorescent light providing shadow free, bright illumination. Stand: Highly optimized design concealed balancing mechanism with feather-touch movement to place the lens in the correct position and orientation. Lens center can reach out 900 mm in front of mount axis with up to 360 degrees swipec.	02
23.	<b>Linear IC trainer:</b> Study of operational amplifier (op-amp IC 741), IC 555 all practical, power supply dc and ac for above said practical's, patch cords, cover etc. manual	02
24.	<b>Digital IC trainer:</b> All Basic gate, universal gate ,Flip Flop(RS,JK,T,D,JKMS) Component should inside the kit, with Kit cover, connecting leads, Power Supply +5V with logic input & output LED, cover, manual etc.	02
25.	<b>Digital IC trainer:</b> Counters, shift registers .Component should inside the kit, with Kit cover, connecting leads, Power Supply +5V,±15V DC with logic input & output LED, cover, manual etc.	02
26.	<b>Power Electronics kit:</b> AC supply ranging from 0 to 30VAC/50Hz, DC supply of +15V, Characteristics study of different types of power electronics Devices ( SCR, TRIAC, DIAC ), UJT, MOSFET, etc., Different gate-pulsing circuits (turn-on methods), Different commutation circuits (turn-off methods), Resistor bank, Capacitor bank, Potentiometer bank, Interconnection points & cords	05

**DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING**

**LIST OF PROPERTY ITEMS/EQUIPMENTS TO BE PURCHASED IN 2014-15**

<b>Sr.No.</b>	<b>Items</b>	<b>No of Licenses</b>	<b>Price per Unit (Rs.)</b>	<b>Total Cost (Rs.)</b>	<b>Remarks (if any)</b>
1.	Synopsys Asia Pac Front End University Bundle (3900-0)	3			
2.	Synopsys Asia Pac Back End University Bundle (3901-0)	3			
3.	Synopsys Asia Pac Full Custom University Bundle (3902-0)	3			
4.	Synopsys Asia Pac Advanced TCAD University Bundle (4458-0)	2			
	*3 Years TSL License for Sr No 1-4				