SRI GAYATRI ENERGY SERVICES

we support you conserve

GST Inv No: SGES/080/2020-21 6 January 2021

GST No : 36AFJPD8910J1ZC

M/s Vidya Jyothi Institute of Technology

Himayathnagar (VI), C.B. Post, R.R Dist. 500075

GST NO: **Nil**

S. No	Description	Qty	Amount in Rs
1	Consulting Charges for Walk Thru Energy Audit		10000/-
	SGST @ 9 % CGST @9%		900/- 900/-
			11800/-
	(Amount : Eleven Thousand Eight hundred only)		

Our Bank Details : M/s Sri Gayatri Energy Services, C.A. No: 62206986509 ,SBI, Nallakunta Branch

IFScode: SBIN0020083

For M/s **Sri Gayatri Energy Services**

D.S.R.Murthy

Authorized Signatory

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Vidya Jyothi Institute of Technology
Himayathnagar (VIII), C.B. Post
Hyderabad-75

2-1-435/1, Ground Floor, St.No:4, Nallakunta,Hyderabad-500044, M: +91984805098
Email: srigayatrienergyservices@gmail.com

Energy Audit

of

M/s VIDYA JYOTHI INSTITUTE OF TECHNOLOGY

(Autonomous)

Himayathnagar (VI), C.B. Post, R.R Dist. 500075

By

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Flat :401, SS Enclave,2-1-255, St. No:14,Nallakunta, Hyderabad,M:9848050598

Email:srigayatrienergyservices@gmail.com

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ACKNOWLEDGEMENT

M/s **Sri Gayatri Energy Services** , Hyderabad places on record its sincere thanks to progressive management of M/s **Vidya Jyoti Institute of Technology ,Hyderabad** ,Telangana for entrusting the Walk through Energy Audit work of their College .

The study team is appreciative of the keen interest and encouragement shown by

Dr. Sri **B.G.Reddy,** **Electrical & Electronics Engineering Department.**

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We trust the data provided by the M/s **VJIT HYDERABAD** , personnel is true to their best of knowledge and we didn't verify the correctness of it.

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Audit Study team

Shri D.S.R.Murthy	Senior Energy Auditor

Sri Gayathri energy services, Hyderabad.

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CERTIFICATE

We here by certify that we carried out Detailed Walk Through Energy Audit on 28.12.2020 at the M/s VJIT, Hyderabad campus and following Observations were presented below. The Power factor maintained is satisfactory and the Management is taking pro Energy conservation measures and installing energy efficient equipment. It started working on Renewable Energy by installing Grid Connected Solar PV at some of the locations inside the campus. We appreciate the efforts of the VJIT , Hyderabad in this regard.

For Sri Gayatri Energy Services

D.S.R. MURTHY
EA-3815
Certified Energy Auditor

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Executive Summary of Observations

1. A Detailed Walk Through Energy Audit is carried out at the Campus with following observations.
2. The Power supply is received from M/s TSSPDCL at 11 KV , 315 KVA ,11 KV/433V is the transformer. The CMD is 200 KVA with TSSPDCL
3. The total connected Load as per the data given provided is 886 KW (Details enclosed)
4. The Energy Bills for the last one year is analyzed for Energy Saving opportunities.
5. During the Last two years the Institute Paid penalty towards CMD FY 2019-20 an amount of Rs 57,233/- and FY 2018-19 an amount of Rs 6,65,575/- . The average CMD recorded during last FY reduced from 230 KVA of previous year to 177 KVA . As the Institute is not running at its capacity due to pandemic it is recommended to keep same the CMD though penalty is paid for couple of months.
6. It is recommended to install MD Controller to check the MD whenever it exceeds and control the same.
7. It is recommended to install Power factor improvement capacitor banks at the individual Blocks to improve the PF and reduce the losses.
8. The 25 % Internal Lighting installed is inefficient conventional copper choke with high losses , It is recommended to replace them with the LED Light fittings of suitable rating , this will save energy . It is learned that the change of conventional light fittings to LED type fittings are in process and is being taken up in phased manner . This is proactive step towards Energy conservation.
9. All the Street Lighting / Building External lighting is LED type , A good energy conservation measure.
10. All the celing Fans which are energy inefficient need to be replaced with BLDC fans which will reduce the energy consumption by 30 -40 % from existing Level.
11. All the Air conditioners installed inside the campus are 3 star rated , which are energy efficient and an energy conservation measure. Further Improvement in star rating of ACs may not be justified in terms of ROI.
12. All the Bore well / submersible/ Sump pumps installed are suggested to be installed with Level Controllers to avoid the over flow of water once tank is filled.
13. It is recommended to install Multifunction meters at all the Incoming Supply of the individual Blocks .
14. It is suggested to maintain record of all the Power Parameters noting from the energy meters installed at various locations to have a close monitoring of energy usage.
15. The Institute installed Grid Connected Solar PV of capacity 25 KW x 4 No's on roof top which is appreciable proactive step towards Energy conservation/Renewable Energy.
16. The Electrical Installation & Power Distribution System is working satisfactorily.

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Walk Through Energy Audit scope of work

1. Physical inspection of the premises with reference to Energy Efficient equipment/ Energy Conservation measures/ Renewable Energy .
2. Identifying the Energy saving Opportunities within the premises by installing efficient equipment /devices / system of the electrical installation.
3. Identifying the Energy Saving opportunities by adopting continuous suitable monitoring methods

Project Schedule :

1. Walk Through Audit : 1 day
2. Report generation : 2-3 Days

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Introduction of the Institution

Vidya Jyothi - A light house of knowledge

Vidya Jyothi Institute of Technology was established in 1998 by Vidya Jyothi Educational Society created by a group of committed academicians and enterprising educationists. VJIT quickly won the confidence of the parent community and the students to become one of the select destinations for future engineers. Soon the lamp of knowledge began to spread its radiance far and wide. The institute is committed to adopt the changes in Engineering Education and strongly believes in and strives to strengthen the Technical Education. The highest quality of VJIT's academics is mirrored in the consistent 95% academic results. The institution registers an average of 82% placements for eligible students.

Facility Description

The Facility Receives Power supply from TSSPDCL at 11 KV , the installed transformer is 11 KV/433 V , 315 KVA and the Contracted Maximum Demand with TSSPDCL is 200 KVA. The total connected Load is around 920 KW.

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LOAD DISTRIBUTION

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The Incoming power supply is from a 11 KV TSSPDCL , with one Transformers of rating 315 KVA , 11 KV /433 V feeding LT Kiosk panel with 800 A FP MCCB as Main Incomer , feeding 800 A FP MCCB. The total connected load is around 886 KW . The emergency supply is taken care by 1 x 200 KVA , 1x 125 KVA DG sets .

The computer work stations installed are approx. 842 No's

The UPS installed at the campus are as follows

S.NO	MAKE OF UPS	UPS CAPACITY	QTY
1	TOPPOWER	12.5 KVA	6
2	POWER GRID	12.5 KVA	3
3	ACCESS	12.5 KVA	3
4	NUMAX	15 KVA	1
5	NUMAX	20 KVA	2
6	**IGBT BASED POWER**	**20 KVA**	1
7	EMERSON	10 KVA	2
8	EMERSON	6 KVA	1
8	HIREL	3 KVA	1
9	UTL	5 KVA	2
10	DELTA	10 KVA	1
11	DSP BASED ONLINE	20 KVA	1
TOTAL AMC UPS			**24**
	NUMARIC (NEW)	10KVA	4
	NUMARIC (NEW)	6 KVA	1
	Offline	3KVA	1
TOTAL			**30**

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Bills of the Institute for the Last Two Years

M/s Vidya Jyoti Institute of Technology, Aziz Nagar, Moinabad, Hyderabad						
Bill Month	**CMD**	**RMD**	**BMD**	**RKVAH**	**Billed Units**	**Bill Amount**
AUG20	200	47.869	160	10518	10444	146063
JUL20	200	54.858	160	14470	13812	172029
JUN20	200	57.58	160	10844	9016	134095
MAY20	200	50.545	160	11526	9266	136528
APR20	200	37.08	160	10922	8300	89521
MAR20	200	180.647	180.647	30096	27300	287945
FEB20	200	145.634	160	23212	23212	247453
JAN20	200	113.533	160	24708	24708	258916
DEC19	200	126.161	160	20442	20442	225579
NOV19	200	200.187	200.187	29060	29060	364718
OCT19	200	240.756	240.756	24670	24670	335936
SEP19	200	232.62	232.62	36632	36632	396222
AUG19	200	246.68	246.68	48112	48112	668037
JUL19	200	235.68	235.68	35132	35132	387582
JUn19	200	227.99	227.99	30785	30785	435504
MAY19	200	212.45	212.45	51021	51021	493304
APR19	200	306.95	306.95	38629	38629	475575
MAR19	200	270.02	270.02	48431	48431	576244
FEB19	200	152.63	160	34119	34119	357301
JAN19	200	108.99	160	25481	25481	265419
DEC18	200	108.42	160	30493	30493	304785
NOV18	200	230.17	230.17	34141	34141	372115
OCT18	200	297.12	297.12	46060	46060	577083
SEP18	200	255.66	255.66	43378	43378	490759

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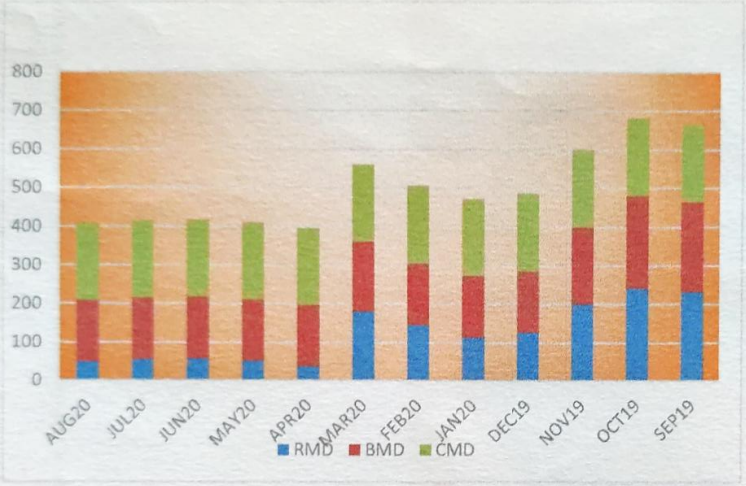
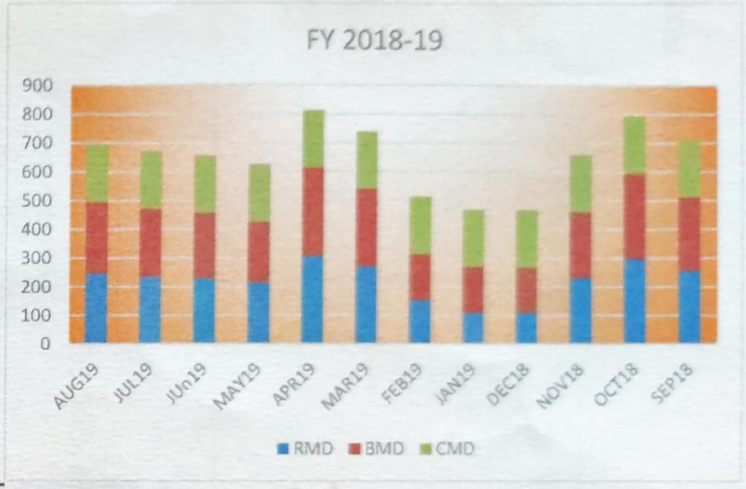
The Demand variation between FY 2019-20 & 2018-19





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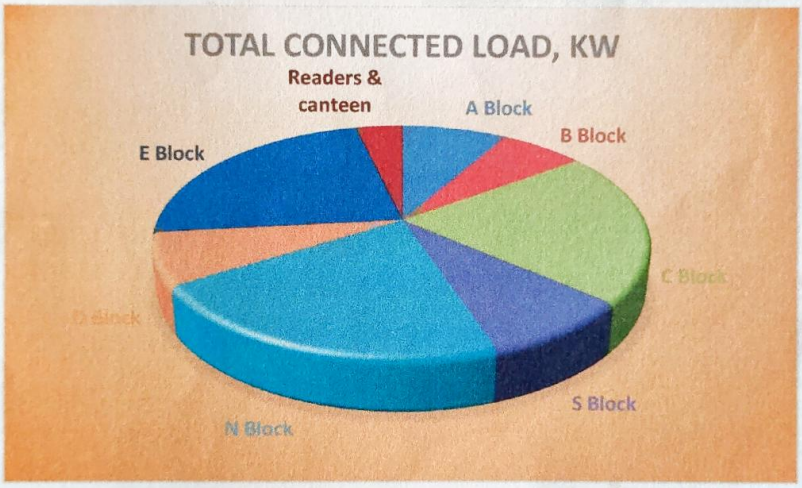
Total Connected Across the Campus

Total Connected Load , KW	
A Block	76.12
B Block	60.817
C Block	197
S Block	78.32
N Block	194.89
D Block	66.26
E Block	213.04
Readers & canteen	33.67
Total	920.117



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A Block			
EQUIPMENTS	**NO. OF EQUIPMETS**	**POWER RATING(W)**	**CONNECTED LOAD (KW)**
TUBE LIGHTS	188	40	7.52
CEILING FAN	195	80	15.6
SYSTEMS	91	150	13.65
PROJECTORS	5	150	0.75
PRINTER	1	300	0.3
SPLIT AC (2TON)	8	1760	14.08
EXHAUST FANS	6	50	0.3
WATER COOLER (200L)	3	1000	3
Examination Branch Load			10
BORE MOTOR	1	5000	5
TOTAL	-	-	76.12 KW

B Block			
EQUIPMENTS	**NO. OF EQUIPMETS**	**POWER RATING(W)**	**CONNECTED LOAD (KW)**
TUBE LIGHTS	100	40	4
CEILING FAN	105	80	8.4
LATHE MACHINE	8	1500	12
TOTAL Mechanical Labs	-	-	36.417
TOTAL LOAD			60.817KW

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C Block			
EQUIPMENTS	NO. OF EQUIPMETS	POWER RATING(W)	CONNECTED LOAD (KW)
TUBE LIGHTS	318	40	12.72
CEILING FAS	177	80	14.16
SYSTEMS	329	150	49.35
PROJECTORS	8	150	1.2
PRINTER	13	300	3.9
AC (2TON)	15	1760	26.4
AC (4TON)	24	3200	76.8
SERVER	5	850	4.25
XEROX MACHINE	2	900	1.8
WATER COOLER	2	500	1
EXHAUST FANS	8	50	0.4
Lift	1	5000	5
TOTAL			197 KW

S Block			
EQUIPMENTS	NO. OF EQUIPMETS	POWER RATING(W)	CONNECTED LOAD (KW)
TUBE LIGHTS	281	40	11.24
CEILING FAN	214	80	17.12
SYSTEMS	44	270	11.88
PROJECTORS	12	150	1.8
PRINTER	4	300	1.2
AC (2TON)	4	1760	7.04
AC (4TON)	2	5600	11.2
WATER COOLER (20L)	1	500	0.5
WATER COOLER (200L)	4	1000	4
EXHAUST FANS	8	50	0.4
TOTAL MACHINES LOAD	-	-	11.936
TOTAL			78.32KW

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N Block			
EQUIPMENTS	NO. OF EQUIPMETS	POWER RATING(W)	CONNECTED LOAD (KW)
TUBE LIGHTS	184	40	7.36
CEILING FAN	210	80	16.8
Led lights	65	20	1.3
SYSTEMS	132	200	26.4
PROJECTORS	15	150	2.25
PRINTER	8	300	2.4
SPLIT AC (2TON)	8	1760	14.08
EXHAUST FANS	6	50	0.3
WATER COOLER (200L)	4	1000	4
All Electricals Lab			120
TOTAL	-	-	194.89KW

D Block			
EQUIPMENTS	NO. OF EQUIPMETS	POWER RATING(W)	CONNECTED LOAD (KW)
TUBE LIGHTS	129	40	5.16
CEILING FAN	137	80	10.96
Led tube lights	24	20	0.48
SYSTEMS	66	150	9.9
PROJECTORS	4	150	0.6
PRINTER	1	300	0.3
SPLIT AC (2TON)	6	1760	10.56
EXHAUST FANS	6	50	0.3
WATER COOLER (200L)	3	1000	3
Civil Engineering Lab Load			20
BORE MOTOR	1	5000	5
TOTAL	-	-	66.26 KW

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E Block			
EQUIPMENTS	**NO. OF EQUIPMETS**	**POWER RATING(W)**	**CONNECTED LOAD (KW)**
CEILING FAN	300	80	24
Led lights	360	9	3.24
SYSTEMS	180	150	27
PROJECTORS	16	150	2.4
PRINTER	5	300	1.5
SPLIT AC (2TON)	20	1760	35.2
SPLIT AC (4TON)	16	3200	51.2
AC(11.5 TONS)	2	9000	18
EXHAUST FANS	10	50	0.5
WATER COOLER (200L)	5	1000	5
ECE Lab Load			15
First year labs			10
BORE MOTOR	1	5000	5
Lift	1	15000	15
TOTAL	-	-	213.04KW

Readers & Canteen			
EQUIPMENTS	**NO. OF EQUIPMETS**	**POWER RATING(W)**	**CONNECTED LOAD (KW)**
TUBE LIGHTS	41	40	**1.64**
CEILING FAN	38	80	**3.04**
NORMAL SOCKET	10	100	**1**
SYSTEMS	**1**	270	**0.27**
EXHAUST FANS	**2**	50	**0.1**
SPLIT AC (2TON)	**2**	7300	**14.6**
COFFEE MACHINE	**1**	1500	**1.5**
ELECTRIC OVEN	**2**	2000	**4**
FRIDGE	**5**	1000	**5**
XEROX MACHINE	**2**	900	**1.8**
TOTAL	-	-	**33.67**

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Maintenance & Electrical Safety

Sri Gayatri energy services, Hyderabad.

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1. **Electrical Single Line Diagram / Lay Out Diagram / Equipment Layout / Electrical Control diagram**
   i. Check for Unauthorized Temporary Installations
   ii. Modification to be Updated
   iii. SLD reflects the actual installation
   iv. Duly approved by statutory authorities

2. **Importance of Electrical Safety in the Overall Safety System**

   Periodicity of comprehensive Electrical Safety check

   i. Understanding of electrical hazards
   ii. Electrical checkpoints in the safety checklist
   iii. Implementation priority for electrical hazards
   iv. Electrical Work Permit System
   v. Safe Electrical Operating Procedures

3 **Electrical Preventive Maintenance**

   i. Is there an Electrical Preventive Maintenance programme in place
   ii. Is the programme implemented? What is the slippage?
   iii. Are the relevant standards (statutes and non-statutory) referred and incorporated in the EPM programme?
   iv. Electrical Tests, Records, Test Procedure and periodicity (earth resistance, insulation resistance tests)
   v. Is the EPM programme only documented?
   vi. Transformer tests (dielectric strength, acidity, sludge deposits, dissolved gases, etc.) and periodicity
   vii. Periodic calibration of meters (ammeter, voltmeter, relays, temperature gauges) and test instruments (insulation resistance megger, earth resistance megger, multi-meters, etc.)

4 **Earthing System**

   i. Installation as per approved design?
   ii. Installation and Maintenance as per IS 3043?
   iii. Earth resistance measured periodically?
   iv. Test procedure
   v. Acceptable earth resistance values
   vi. Is the earthing system modified when electrical installation is modified?
   vii. Are neutral earth pits independent and separate?
   viii. Are earth pits identified?
   ix. Are two and distinct earth connections provided?
   x. Is the earth continuity tested?
   xi. Is bonding and earthing carried out to avoid ESD hazards?

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Annexure I

Conversion factors

CONVERSION TABLES

1 Kcal	3.9685 Btu
1 KWh	3413 Btu
1 KWh	860 kcal
1 Btu	1.055 kJ
1 calorie	4.186 joules
1 hp	746 Watts
1 kg	2.2 lb (pounds)
1 meters	3.28 feet
1 inch	2.54 cm
1 kg/cm²	14.22 psi
1 atmosphere	1.0332 kg/cm²
1 kg/cm²	10 meters of water column @ 4 °C
1 kg/cm²	9.807 × 10 4 passels
1 Ton of Refrigeration	3023 kcal/hour
1 Ton of Refrigeration	12000 Btu/hour
1 US Gallon	3.785 liters
1 imperial Gallon	4.546 liters
°F	1.8 × °C + 32
°k	°c + 273

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Annexure -II -Abbreviations &Definitions

Abbreviations

°C	degrees Celsius
°F	degrees Fahrenheit
Btu	British thermal unit
Btu/ft2	British thermal units per square foot
J/m^2	Joules per square meter
kVA	kilovolt-amperes
kW	kilowatts
kWh	kilowatt-hours
kWh/m^2	kilowatt-hours per square meter

Definitions :

Basic definitions of terms

Absorber. The component of the vapour absorption chilling package wherein the refrigerant vapour is absorbed by the liquid absorbent.

Air Handling Unit. An air cooling unit, consisting of a blower or blowers, heat exchanger and filters with refrigerant, chilled water or brine on the tube side to perform one or more of the functions of circulating, cooling, cleaning, humidifying, dehumidifying and mixing of air.

Brine. Solution of anti-freeze substances like Sodium Chloride, Calcium Chloride, Mono-ethylene Glycol, Ethyl Alcohol etc.

Coefficient of Performance. The ratio of Net Refrigerating Effect divided by Compressor Shaft Power Or Thermal Power Input. The numerator and denominator should be in the same measuring units.

Compressors. Machines in which compression of refrigerant vapour is effected by the positive action of linear motion of pistons, rotating elements (screws, vanes, scrolls etc.) or conversion of velocity energy to pressure in a centrifugal device.

Compressor, hermetic. Sealed compressor & motor unit, where the electric motor is cooled by the refrigerant and both the compressor and electric motor are not accessible for maintenance.

Compressor, open. Compressor is externally coupled to the prime mover and the refrigerant does not cool the prime mover.

Compressor, semi-hermetic. Compressor motor unit, where the electric motor is cooled by the refrigerant and the compressor is accessible for maintenance.

Condenser. The heat exchanger, which utilizes refrigerant to water/air heat transfer, causing the refrigerant to condense and the water/air to be heated. De-superheating or sub-cooling of the refrigerant may also occur.

Energy Efficiency Ratio. The ratio of Net Refrigerating Effect (Btu/hr) divided by Shaft Power (Watts) or Thermal Power Input (Watts) consumed.

Electric Motor. Electrically operated rotary prime mover.

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Enthalpy. The heat content of a substance at a particular temperature.
Engine. Internal combustion engine used as prime mover.
Evaporator. The heat exchanger wherein the refrigerant evaporates and, in the process, cools another fluid I(generally water, brine or air).
Fluid. The substance that is usefully cooled in the chilling package (generally water, brine or air).
Generator. The component of a vapor absorption chilling package wherein the absorbent solution is heated to evaporate the refrigerant and concentrate the absorbent.
Gross Calorific Value. The amount of heat produced per unit of fuel when complete combustion takes place at constant pressure, the products of combustion are cooled to the initial temperature of the fuel and air, and the vapor formed during combustion is condensed.
Net Refrigeration Effect. The useful cooling effect (or heat removal) in the evaporator.
Psychometric Chart. A chart or plotted curves showing the various parameters of air at different temperatures at atmospheric pressure. The parameters shown include dry bulb temperature, wet bulb temperature, relative humidity, moisture content, enthalpy and sensible heat factor.
Refrigerant. The substance that evaporates in the evaporator to provide cooling effect.
Shaft Power. Power at the shaft of any rotary equipment.
Specific Fuel Consumption. The ratio of Thermal Power Input (kg/h of liquid fuel or m3/h of gaseous fuel consumed to the Net Refrigerating Effect (Tons of Refrigeration).
Specific humidity. Mass of water vapor per unit mass of dry air.
Specific Power Consumption. The ratio of Shaft Power (kW) to the Net Refrigerating Effect (Tons of Refrigeration).
Specific Steam Consumption. The ratio of Thermal Power Input (kg/h of steam) to the Net Refrigerating Effect (Tons of Refrigeration).
Speed. The number of revolutions per minute of the shaft.
Temperature, dry bulb. The temperature indicated by any temperature sensing element when held in air.
Temperature, Inlet. Temperature measured at the inlet stream of the heat exchanger.
Temperature, Outlet. Temperature measured at the outlet stream of the heat exchanger

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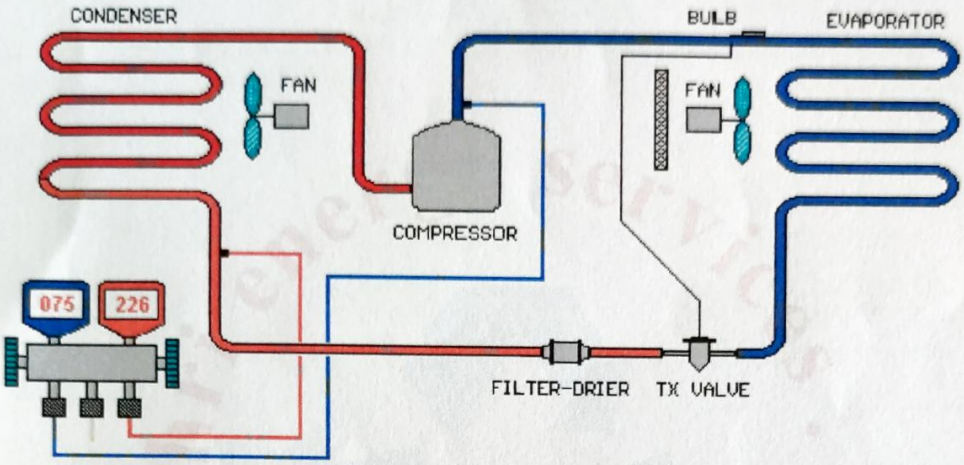
Annexure :3 HVAC

Introduction & back ground

Refrigeration Basics



- Refrigeration is the removal of heat from a material or space, so that it's temperature is lower than that of it's surroundings.
- When refrigerant absorbs the unwanted heat, this raises the refrigerant's temperature ("Saturation Temperature") so that it changes from a liquid to a gas — it evaporates. The system then uses condensation to release the heat and change the refrigerant back into a liquid. This is called "Latent Heat".
- This cycle is based on the physical principle, that a liquid extracts heat from the surrounding area as it expands (boils) into a gas.
- To accomplish this, the refrigerant is pumped through a closed looped pipe system.
- The closed looped pipe system stops the refrigerant from becoming contaminated and controls its stream. The refrigerant will be both a vapor and a liquid in the loop.

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Annexure - 4 Lighting

Recommended illumination Levels as Per IS 3646 Part I-1992			
Type of Interior Activity	Range of Service Illuminanace in Lux	Quality Class of Direct Glare Limitation	Remarks
Education			
Assembly Halls	200-300-500	3	
Teaching Spaces	200-300-500	1	
Lecture Theatres			
i) General	200-300-500	1	
ii) Demo Benches	300-500-700	1	Localized Lighting may be appropriate
iii) Seminar Rooms	300-500-750	1	
iv) Art Rooms	300-500-750	1	
v) laboratories	300-500-750	1	
vi) Libraries	200-300-500	1	
vii)Music Rooms	200-300-500	1	
viii) Sports Hall	200-300-500	1	
ix) Work Shop	200-300-500	1	
x)Computer Work station	300-500-750	1	
xi)Bath Rooms	50-100-150		Supplementary local lighting near mirror
xii) Office Rooms	300-500-750	1	
xiii) Entrance Halls, Lobbies	150-200-300	2	
xiv) Corridors, Passageway, Stairs	50-100-150	2	

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Light Source Comparison			
Attributes	**Incandescent**	**CFL**	**LED**
Colur Rendering Index	100	Greater than 80	40-80
Watts/ Lamp	100	23	1
Lumen/Lamp	1600	1600	30
Lumen/Watt	16	60-80	20-30
Life (Hrs)	750	8000	50,000

Colour Rendenring Index

1500 K	Candlelight
2680 K	40 W incandescent lamp
3000 K	200 W incandescent lamp
3200 K	Sunrise/sunset
3400 K	Tungsten lamp
3400 K	1 hour from dusk/dawn
5000-4500 K	Xenon lamp/light arc
5500 K	Sunny daylight around noon
5500-5600 K	Electronic photo flash
6500-7500 K	Overcast sky
9000-12000 K	Blue sky

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Hyderabad-75.