SPE News Letter

January, 2022 Issue: 1/2022

SILVER JUBILEE YEAR [1996-2021]

Wish You Happy New Year 2022

Let Kite (Power Generation) Goes up .. Wtihout any Cut (Power Cut)

Welcome 2022 & Silver Jubilee Year

Society of Power Engineers (India)

Vadodara Chapter (Estd. 1996)

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FROM THE CHAIRMAN'S DESK

Dear Readers,

At the outset I wish all the readers a **HAPPY and PROSPEROUS NEW YEAR 2022**. Year 2021 has been challenging because of Covid-19 with many negative events like extreme weather, heavy rains, floods and likes as the result of adverse effect of climate change. These disastrous effects which are more frequent during last few decades compelled the world's leaders and scientists to take note and find solution to mitigate the cause that is responsible for climate change. Several meetings among the countries have taken place for discussions and deciding the action plan for each country and their responsibility since 1992-Earth Summit,1997-Kyoto Protocol, 2015-Paris Agreement and then, COP-the Conference of the Parties. COP is the world's supreme decision-making body which meets annually to assess progress in dealing with climate change. In 2015, Paris Agreement was reached by the world leaders, where 197 countries had agreed to keep temperature rise of climate below 1.5^0 C. Experts and scientist expressed that this goal can be met by achieving Net Zero by 2050, by cutting emissions. Net zero refers to the balance between the amount of greenhouse gas produced and the amount of Gas removed from the atmosphere. To be precise, we reach net zero when the amount we add is no more than the amount taken away.

At the end of year 2021 in November, 26th annual summit, COP26 was held in Glasgow. The summit was aimed to reach a global agreement in reducing the worst impacts of the climate change and global warming. Greenhouse gases like carbon dioxide, methane are released when we burn oil, gas and coal for our homes, factories, transport, farming, landfills etc. These gases cause global warming by trapping the sun's energy. In this summit, 130 countries have collectively pledged to reduce emission by achieving net zero by 2050.

During the summit, attended by our PM Modi, many decisions have taken place consisting of a range of agreed items, including strengthened efforts to build resilience against worsening impacts of climate change, curbing greenhouse gas emissions and providing the necessary finance for both. Nations reaffirmed their duty to fulfill the pledge of providing one hundred billion dollars annually from developed countries to developing countries.

There is provision of technical assistance for averting, minimizing, and addressing loss and damage at the local, national, and regional levels. The package also includes schemes that enable rich countries to offset their emissions by paying poorer countries to switch to cleaner fuels. However, experts fear that such arrangements will allow rich countries to continue using fossil fuel that may not help reduction in sum of greenhouse gases emitted globally.

India has promised first time to reach this goal by 2070, which is far past the 2050 goal for net zero, as it does not want to compromise in its fast-expanding energy need that is being met by its large reserves of coal. It will phase down use of coal energy with slower speed otherwise it will hamper its economic growth ambitions. However, PM Modi has assured the world that India is most serious towards reducing the emission by announcing five commitments at summit as under.

India will achieve the target of 'net zero' carbon emissions by 2070.

It will bring its non-fossil fuel energy capacity to 500 GW by 2030.

It will fulfill 50% of its energy requirement through renewable energy by 2030.

It will cut down its net projected carbon emission by one billion ton from now until 2030.

It will bring down carbon intensity of its economy by more than 45%.

This is no doubt a real climate action and looking at fast progress in renewable energy additions during last decade, this is an achievable target. This action is seen as India's seriousness about climate change without compromising its economic growth. India will reach net zero by mitigation of greenhouse gases by adopting practices like using solar, wind, wave, tidal, geothermal, hydro-electric, nuclear etc. The commitments made are expected to benefit the country in long term with modern technologies in energy efficiency, carbon capture and green fuels. It can utilize the technology for developing energy storage system, electrical vehicles and charging infrastructure, hydrogen fuel etc.

We are aware that climate change is one of the biggest issues, but many people are not aware of how seriously it can affect our life

SPE(I), Vadodara Chapter is keen now to bring this subject in SP's future programmes by organizing various Seminars, Conferences and Workshops for our members and public by involving organizations like CBIP, GEDA, engineering colleges Institutions and other like-minded professional bodies in India. I am sure we will get all the active supports from the members to play our part in saving our planet.

Thanking you,

Er. GV Akre
Chairman

EDITORIAL:

Dear Readers,

The calendar has changed leaving behind the year 2021. It was really painful year for India and the World. The ugly face of Covid-19 surfaced again killing thousands and making lakhs of people dependent upon Government machinery. It is unfortunate that after taking a toll of millions of people across the Globe, the pandemic is surfacing again with a different variant called "Omicron". Though it is labeled as mild, no one wants to take a chance. In the second wave, we have lost many members of SPE(I). Many members have lost their near and dear to the virus.

The activities of the Chapter started resuming off line over last 4-5 months. However, there is question mark on them at least for two month now. Precautions and Covid protocols are very important.

What really saddens me is the fact that the planning of the events to celebrate the Silver Jubilee of the Chapter required frequent post-ponement. The pandemic has international connections. Embargo on international travel has given setback to the business.

The online meetings fulfill part of the business requirement but the charm of personal meetings cannot be compared to the online meetings due to various technical constraints. For example, when you try to obtain approvals of technical documents, particularly the detailed design of equipment, it becomes too difficult to explain the various parameters as well as software related output. If the web meeting is to be done on mobile or laptop, it becomes further difficult. If one is equipped with media gadgets, he can be comfortable at his end but much depends on what gadgets the other party sharing the screen, has at its end. The web meetings are centred around the main topic of the business and affords very little development of personal bond. We can compare this with ONLINE/OFFLINE teaching. However, with no option left, we have to depend upon web meeting. The web meetings are really very good for assorted discussion and casual co-ordination matters.

Further, if video recording is done, re-calling the discussion and preparation of MoM becomes easy.

Web meeting is excellent for international connect. As a consultant, I have attended several web meetings with participants sitting in various countries such as Iran, Iraq, Italy, Kenya, Mozambique, Dubai, Qatar etc. The business is through without personal meetings. But the fact remains that in the above meetings, the participants were highly responsible persons. On the other hand I am witness to number of web meetings with utilities where number of officers join the meeting including some of them on mobile while travelling. The level of attention and accountability reduces to a great extent in such meetings and lands into an arena of "Somebody, Anybody, Nobody, and Everybody". Ultimately someone prepares MoM and it is approved with a simple glance by others.

As a responsible consultant, I have depended upon WhatsApp and Internet for drafting reports and opinions, In April-2021, when second wave of Corona was on its peak, I was requested to opine in one matter related to sub-station with total ban on travel and seizure by Covid-19, I was compelled to take video call assistance for preparation of report. I could do it because of awareness of where to strike.

Even our Vadodara Chapter has a good track record of web-meetings during active Corona waves. However, most of the members who attended it were longing for off-line meeting due to habit of enjoying personal meetings with cross talking, murmuring in to ears of the person sitting next to him/her and sumptuous breakfast.

To conclude it can be stated that human is a social creature and would always love to have one to one physical correspondence no matter what advance-ment the technology offers. Imagine how students are suffering mentally while they are missing their schools & colleges. Online teaching and learning is a compulsion.

Let me wish **HAPPY YEAR** of **2022** to all the **READERS**

Er. SM Takalkar
Vice-Chairman

CHAPTER'S ACTIVITIES

➢ On **03 Oct 2021** the **Chapter** organized **Satya Narayan Pooja** to celebrate the **Foundation Day** of the Chapter**.** The pooja, which was organized at the office premises of the Chapter, was well attended by members and their spouse. The pooja was performed by **Er. SM Takalkar,** Vice-Chairman of the Chapter and his better half **Mrs. Purnima.** The members and their family availed Prasad and greeted each other.

➢ On **23 Oct 2021** the **Chapter** organized evening lecture session on the topic of "**Robot for the Management of HV Assets**".

The speaker was **Er. Nihar Raj,** VP in Adani Transmission Group and Patron of SPE(I) Vadodara. His presentation covered the following.

- Robots are used in maintenance of EHV/UHV Transmission Lines and Sub–Stations for increasing the reliability / availability of the assets and for cutting down the cost of manpower.
- Classification and Technical requirements like Patrolling, Inspection, House Keeping etc.
- Use of Robots for conditioning monitoring and live line maintenance.
- Advancement in other countries.

There were lot of questions from the members which were nicely answered by the presenter.

In the beginning, **Er. SM Takalkar**, Vice-Chairman introduced the speaker. **Er. PH Rana**, Patron informed the members regarding the plans of Silver Jubilee celebration of the Chapter. **Er. Ambikesh Padhya**, Chairman-IE(I) Vadodara Local Centre, also gave a welcome speech and assured the members of IE(I) and SPE(I) Vadodara that many programmes will be organized jointly on regular basis. **Er. GV Akre**, Chairman also spoke on the occasion. **Er. YV Joshi**, Secretary presented vote of thanks.

➢ On **10 Nov 2021** the **Chapter** celebrated the **"Power Day"** by organizing a Seminar on **"Engineering Interface in Power System"** jointly with **IE(I)** Vadodara to commemorate establishment of first Hydro Electric Power House in Sindrapang (near Darjeeling) on 10 Nov 1897.

Hon'ble Mayor of Vadodara **Er. Keyur Rokadia** was the chief guest of the event. In his speech he highlighted the role of engineers in all walks of life. Being a Post graduate in Civil Engineering he touched upon various issues related to civil maintenance and flood/water management by the civic body. Three learned speakers also made presentation as follows:

1. **Er. PH Rana**, Ex-Member (Tech) of GEB and Patron of SPE(I) Vadodara presented the details of Sardar Sarovar Project in Kevadia, Gujarat.

2. **Er. SM Takalkar, MD of** Power Consultant and Vice-Chairman of SPE(I) Vadodara spoke on interface of engineering in Power System.
3. **Er. Chirag Baxi**, Retd. AGM & HOD(Civil), GNFC spoke on special grade of concrete developed by him which can be used for marine construction work as it allows sea water to be used.

➢ On **19 Nov 2021** the **Chapter** organized a lecture on the topic of **"Power your mind for better interpersonal relationship".**

The learned speaker was **Dr. Usha Vasthare**, founder of Yoga Kshema Rehabilitation and Wellness Centre, Philadelphia.

In her speech, she enumerated the very facts and discoveries that are being uncovered in the field of Neuroscience. Interpersonal relationship is vital for quality life, she added.

- On **14 Dec 2021** the **Electrical Department of Vadodara Division of Western Railway** invited **SPE(I)** Vadodara and **IE(I)** Vadodara to give presentation on **"Energy Conservation"**. The event was arranged in conference room of DRM's office, WR, Pratapnagar, Vadodara. **Er. SM Takalkar**, Vice-Chairman and **Er. PA Shah**, ACM represented SPE(I), Vadodara. **Er. Keyur Thakkar** and **Er. SK Joshi** represented IE(I) Vadodara

  Er. Amit Gupta, DRM, WR, Vadodara presided over the event.

  Er. SM Takalkar stated that normal understanding of Energy Conservation is switching of electrical equipment when not required. However, Energy Conservation also mean avoiding wastage of resources which include water, coal, steel, wood, mine/minerals, fuel etc. Overdesigning of any Civil structure or Electrical / Mechanical equipment is also a wastage of energy.

  Er. PA shah made detailed presentation on Energy Conservation. He described the ways and means to save energy in day to day working. He also presented some case studies.

  Er. SK Joshi made presentation on Renewable Sources of Energy. He also described the problem of Harmonics in Solar and Wind Power and also means to mitigate them. He also briefed about Electrical vehicles.

  Er. Shakeel Ahmed, Sr. DEE anchored the session.

  The engineers of Vadodara Division of WR were present in a big number. The event was organized by DRM office, WR as a part of celebration of "**Energy Conservation Week**"

- On **14 Dec 2021** the **Chapter** celebrated **"Energy Conservation Day".** Popular lectures were organized in the Vasvik Hall of Institution of Engineers (I), Vadodara Local Centre.

  Er. PA Shah, Retd. CE, GETCO and ACM of SPE(I) Vadodara spoke on the topic of **"Critical Analysis of Energy Bill as Tool for Energy Management".** He touched upon the following:

  - Importance of Energy Conservation Day
  - Aspects of Energy Audit
  - Basic parameters of Electrical Power
  - Billing component
  - Calculations of Energy Bill
  - Weighted average Maximum Demand
  - Night consumption discounts
  - Component of Power Factor built in the tariff.

  Er. (Ms.) Hetal Trivedi, Director, Trivedi Group of Companies and Life Member of SPE(I) Vadodara, delivered a talk on the topic of **"Energy Audit".**
  Her presentation revolved round the following:
  - Concept of Energy Conservation
  - Purpose of Audit
  - Range of saving through Audit

  Er. RM Panchal, Retd, CE, GEB**,** Energy Auditor**,** and Life Member of SPE(I) Vadodara delivered a talk on **"Energy Audit"** in small, medium and large industries. He presented various case studies and showed that due to energy audit there was sizeable reduction in specific energy consumption.

Er. YV Joshi
Secretary

FUTURE PROGRAMMES

The Chapter has planned following programmes in near future.

1. Half-Day event on "Power reforms and its impact on Power Sector of the Country".
2. Cultural programme "SPE has got talent" by the members and spouse of the Chapter(with spouse Lunch/Dinner)
3. Silver Jubilee celebration and felicitating the Well Wishers & contributors responsible for the growth of the Chapter (with spouse Lunch / Dinner)
4. Supporting CBIP in organizing a national event on "Power Reforms"(25 & 26 May 20220 at LV Palace, Vadodara.
5. All India AGM of SPE(I). The detailed information will be given from time to time.

BASIC ABOUT TRANSFORMER
(ESPECIALLY FOR ENGINEERING STUDENTS)
By Er. PA Shah, Retd. CE, GETCO

1. The transformation ratio

It is defined as the ratio of secondary terminal voltage **Vs** to primary terminal voltage **Vp**. **T** is number of Turns and **I** is Current; while **'p'** stands for primary and **'s'** stands for secondary. It is denoted by **k**.

K = (Vs/Vp) = (Ts/Tp) = (Ip/Is)

2. Classification of transformer

Based on construction, the types are:

- Core type and
- Shell type transformer

Based on applications

- Distribution Transformers
- Power Transformers
- Generator Transformers
- Special Transformers / Equipment Testing Transformers
- Instrument Transformers
- Electronics Transformers

Based on the type of connection

- Single phase transformer
- Three phase transformer

Based on the frequency range

- Power frequency transformer
- Audio frequency transformer
- UHF transformers
- Wide band transformers
- Narrow band transformers
- Pulse transformers

Based on the number of windings

- Auto transformer
- Two winding transformer

3. Definition of windows space factor or window area constant

It is defined as the ratio of copper in the window to the window area.

kW = Ac / Aw < 1, where,

Ac is the area of copper in M^2

Aw is the area of window in M^2

4. Definition of iron space factor

It is defined as the ratio of gross core area to the area of the circumscribing circle.

Kis = Agi / Ace < 1, Where,

Agi is the gross core area in M^2

Ace is the area of circumscribing circle in M^2

5. Basic function of a transformer

- It increases or decreases the voltage at same frequency.
- It follows the equation, **K = (Vs/Vp) = (Ts/Tp) = (Ip/Is)**
- It transforms energy from one winding to other winding at constant frequency.
- It is used in electronic circuits to convert **AC** to **DC.**
- It provides isolation between two electrical circuits.

6. The cause of noise in transformer.

- Mechanical forces developed during working
- Loosening of stampings in the core
- Expansion and contraction of oil level
- Excessive eddy current.
- It provides cooling.
- It acts as an insulation.
- It protects the paper from dirt and moisture.

7. The properties of transformer oil.

1. High dielectric strength
2. High resistivity and density
3. Low viscosity
4. Low impurity
5. Reasonable cost and high flash point
6. Resistance to emulsion

Sludge formation due to passage of current and degradation of various components within the transformer

8. Reasons for using transformer oil as cooling medium

- When transformer oil is used as coolant, the heat dissipation by convection is 10 times more than the convection due to air.
- The Specific heat dissipation by convection due **t**o air = 8 W/ M^2– C.
- The Specific heat dissipation by convection due to oil = 80 to 100 W/M^2 – C.
- Oil filled transformers are not preferred for mining electrical installations

9. Factors to be considered for selecting the cooling method of a transformer.

The choice of cooling method depends on kVA rating of transformer, size, application and the site condition where it has to be installed.

10. Different methods of cooling of transformer.

- Air Natural - **AN**
- Air Blast - **AB**
- Oil Natural - **ON**
- Oil Natural & Air Forced - **ONAF**
- Oil Natural & Water Forced - **ONWF**
- Forced Circulation Of Oil - **OF**
- Oil Forced & Air Natural - **OFAN**
- Oil Forced & Air Forced - **OFAF**
- Oil Forced & Water Forced - **OFWF**

11. An expression for the heating time constant of transformer

Heating time constant of transformer is given as $T_h = \frac{Gh}{S\lambda}$

Where G is weight, h is specific heat, S is surface area and λ is the specific heat dissipation.

12. Reason for providing cooling tubes (radiators) in transformer

Cooling tubes (radiators) are provided to increase the heat dissipating area of the tank as oil circulates through the radiators.

13. An expression for magnetizing current.

The magnetizing current is given by

$$I_m = \frac{\text{Magnetizing VA/Kg*Weight of Force}}{\text{Number of phases*Voltage/phase}}$$

14. An expression for temperature rise in plain walled tanks.

$$\text{Temperature rise} = \frac{\text{Total Loss}}{\text{Specific heat dissipation*heat dissipating surface of the tank}}$$

$$= \frac{P_i + P_c}{12.5\ S_t}$$

Where P_i = iron loss,

P_c = copper loss,

S_t = Heat dissipating surface of the tank

15. Transformer Tank Wall

The plain walled tanks are used for small rating transformers as heat generated can be easily dissipated. The plain walled tanks are not used for large output transformers as they are not sufficient to dissipate losses. This is because volume and hence losses increase as cube of linear dimensions while the dissipating surface increases as the square of linear dimensions. Thus an increase in rating results in an increase in loss to be dissipated per unit area giving a higher temperature rise.

16. Estimation of leakage reactance of winding.

It is done by primarily estimating the distribution of linkage flux and the resulting flux linkages of the primary and the secondary windings. The distribution of the linkage flux depends upon the geometrical configuration of the coils, the neighboring iron masses and also on the permeability of the iron used in the core (silicon or Iron or Metal).

17. Stacking factor and its typical value.

$$\text{Stacking factor} = \frac{\text{Cross section area of iron in core}}{\text{Cross section area of Core including insulation}}$$

Its typical value is **0.9**.

18. Use of stepped cores in transformers.

When stepped cores are used, the diameters of the circumscribing circle is minimum for a given area of the core, which helps in reducing the length of mean turn of the winding with consequent reduction in both the cost of copper and copper loss.

19. The range of flux densities used in the design of a transformer.

When hot rolled silicon steel is used,

Bm = 1.1 to 1.4 Wb / M^2 for distribution transformer

= 1.2 to 1.5 Wb / M^2 for power transformer, when cold rolled silicon steel is used,

Bm = 1.5 Wb/M^2 for up to 132kV transformer

= 1.6 Wb/M^2 for 132kV to 275kV transformer

= 1.7 Wb / M^2 for 275kV to 400kV transformer

20. The factors to be considered to choose the type of winding for a core type transformer.

- Current Density
- Short Circuit Current
- Surge Voltage
- Impedance
- Temperature Rise
- Transport Facilities

21. Typical values of core area factor for transformers.

Core area factor (K_c) for various transformers:

- Square core K_c = 0.45
- Cruciform core K_c = 0.56
- Three stepped core K_c = 0.6
- Four stepped core K_c = 0.62

22. Consideration for calculation of leakage flux and leakage reactance.

- The primary and secondary windings have an equal axial length
- The flux paths are parallel to the windings along the axial height
- Primary winding mmf is equal to secondary winding mmf
- Half of the leakage flux in the duct links with each winding
- The length of the mean turn of the windings are equal
- The reluctance of flux path through yoke is negligible

23. The copper space factor.

For a transformer, it is the ratio of conductor area and window area.

$$\text{Copper Space factor} = \frac{\text{Conductor area}}{\text{Window area}}$$

24. Various types of cross section used for core type transformer.

- Rectangle
- Cruciform and
- Multi stepped cores

25. EMF of Transformer.

EMF induced in primary and secondary windings are worked out by the following equations;

$$\mathbf{Ep = 4.44 \times f \times Np \times Bm \times A}$$

$$\mathbf{Es = 4.44 \times f \times Ns \times Bm \times A}$$

Where,

Ep & Es are EMF induced in primary and secondary windings respectively.

f is the power frequency

Bm is maximum flux density

A is the area of core.

26. Reasons for the cores of large transformers built up with circular cross-section?

The excessive leakage fluxes produced during short circuit and over loads develop mechanical stresses in the coils. These forces are radial in circular coils and there is no tendency for the coil to change its shape. But in rectangular coils, these forces are perpendicular and tend to deform the coil.

27. Expression for kVA rating of a single and three phase transformer

Rating of a single phase & three phase transformer in kVA is given as

$$\mathbf{Q = 2.22\ f\ B_m\ \delta\ K_w\ A_w\ A_i * 10^{-3}}$$

Where f = frequency, Hz

B_m = maximum flux density, Wb/m^2

δ = current density, A/mm^2

K_w = Window space factor

A_w = Window area, m^2

A_i = Net core area, m^2

28. Different types of low voltage windings

- Cylindrical windings
- Helical winding

29. Range of efficiency of a transformer

The efficiency will be in the range of 94% to 99%.

30. Position of low voltage winding in the transformer.

The winding & core are both made of metals and so insulation has to be placed in between them. The thickness of insulation depends on the voltage rating of the winding. In order to reduce the insulation requirement the low voltage winding is placed near the core.

31. Disadvantages of stepped cores.

With large number of steps a large number of different sizes of laminations have to be used. This results in higher labor charges for shearing and assembling different types of laminations. The time and space required for core assembly is also more.

32. The objective behind using sheet steel stampings in the construction of Transformer.

The stampings are used to reduce the eddy current losses. The stampings are insulated by a thin coating of varnish, hence when the stampings are stacked to form a core, the resistance for the eddy current is very high.

33. The tertiary winding?

The three phase transformers may have a third winding called tertiary winding apart from primary and secondary. It is also called auxiliary winding or stabilizing winding.

The tertiary winding is provided in a transformer for any one of the following reasons:

- To supply small additional load at a different voltage
- To give supply to phase compensating devices such as capacitors which work at different voltage
- To limit short circuit current
- To indicate voltage in high voltage testing transformer.
- To filter out harmonics

34. Connection of the tertiary winding.

The tertiary winding is normally connected in delta. When the tertiary is connected in delta, the unbalance in the phase voltage during unsymmetrical faults in primary or secondary, is compensated by the circulating currents flowing in the closed delta.

35. The salient features of distribution transformer.

- When transformer oil is used as coolant, the heat dissipation by convection is 10 times more than the convection due to air.
- The Specific heat dissipation by convection due to air = $8W/M^2 - C$.
- The transformers will have plain walled tanks with cooling tubes or radiators.
- The leakage reactance and regulation will be low.

36. Forces acting on the coils of a transformer in the event of a short circuit.

During short circuit conditions the radial forces will be acting on the coil, which is due to short circuit currents.

37. The range of current densities used in the design of transformer winding.

The choice of current density depends on the allowable temperature rise, copper loss and method of cooling. The range of current density for various types of transformers is given below:

- δ = 1.1 to 2.2 A/mm^2 - For distribution transformers
- δ = 1.1 to 2.2 A/mm^2 - For small power transformers with self-oil cooling
- δ = 2.2 to 3.2 A/mm^2 - For large power transformers with self-oil cooling
- δ = 5.4 to 6.2 A/mm^a - For large power transformers with forced circulation of oil

38. Application of magnetic curves for estimating the no-load current of a transformer.

The B –H curve can be used to find the mmf per metre for the flux densities in yoke and core. The loss curve can be used to estimate the iron loss per Kg for the flux densities in yoke and core.

39. Conservator Tank.

A conservator is a small cylindrical drum fitted just above the transformer main tank. It is used to allow the expansion and contraction of oil without contact with surrounding atmosphere.

When conservator is fitted in a transformer, the tank is fully filled with oil and the conservator is half filled with oil.

40. Use of silica gel in breather.

The silica gel is used to absorb the moisture when the air is drawn from atmosphere into the transformer tank and the conservator tank.

42. The merits and demerits of using water for forced cooling of transformers.

The advantage in forced water cooling is that large amount of heat can be removed quickly

from the transformer.

The disadvantage in forced water cooling is that the water may leak into oil and the oil may be contaminated.

Water cooling can be used in hydro power generator transformers also or unit auxiliary transformer.

Distribution Transformer

Current Transformer

Power Transformer

Potential Transformer

ACKNOWLEDGEMENT

Following Members / Well Wishers have donated towards Silver Jubilee Celebration of SPE(I) Vadodara Chapter

Sr. No.	Member's name	Donation (Rs.)	Sr. No.	Member's name	Donation (Rs.)
01	Er. NG Yadav	2,221	51	Er. Rumika Engineering	10,000
02	Er. BN Raval	5,000	52	Voltamp Transformers	20,000
03	Er. BM Patel	2,021	53	Torrent Power Ltd.	50,000
04	Er. RM Panchal	1,501	54	GETCO	20,000
05	Er. NH Rajpura	1,501	55	PC Patel Mahalaxmi	10,000
06	Er. SG Prasad	2,525	56	Soham Technologies	11,000
07	Er. RS Mulay	2,000	57	Roha Dyechem Pvt. Ltd.	20,000
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19	Er. RC Shah	2,500	69	Er. (Prof.) AK Singh	1,000
20	Er. (Prof.) VS Patel	1,111	70	Er. ND Makwana	2,555
21	Er. RV Vibhakar	2,500	71	Er. YV Joshi	5,001
22	Er. VI Trivedi	1,111	72	Er. Manoj Kumar (BHEL)	2,100
23	Er. (Smt.) NN Lathia	5,000	73	Er. RR Tewar	1,001
24	Er SM Takalkar	25,000	74	Er GM Hingoo	1,501
25	Er. GV Akre	25,000	75	Er. SS Sutar	1,100
26	Er. SP Trivedi	2,000	76	Er. VB Harani	2,100
27	Er. DV Patel	2,111	77	Er. CM Dalal	2,500
28	Er. Jayesh Mankad	1,111	78	Er. SR Trivedi	1,000
29	Er. RS Shah	2,500	79	Er. GSECL	40,000
30	Er. DM Desai	3,333	80	Telegence Powercon	5,000
31	Er. JK Surti	1,600	81	Er. JC Marathe	5,555
32	Er. NC Solanki	1,501	82	Er. AN Master	5,000
33	Er. GP Shukla	1,100	83	Well Wisher	2,501
34	Er. RR Vishvakarma	2,501	84	Er. RB Desai	2,501
35	Er. SD Kanitkar	2,501	85	Er. KK Roy	10,000
36	Er. HM Solanki	3,000	86	Gayatri Metallic, VV Nagar	2,500
37	Er. KN Velani	1,111	87	Er. RS Verma	1,100
38	Er. RC Valera	3,000	88	Er. HM Hathi	1,100
39	Er. VJ Desai	2,501	89	Er. VR Karia	11,111
40	Er. YD Mehta	1,100	90	Er. SK Negi	25,000
41	Er. KN Parikh	1,100	91		1,001
42	Er. RA Surati	1,111	92	Er. HB Parikh	1,100
43	Er. (Dr.) Shivani Sharma	11,000	93	Er. TR Patel	5,000
44	Er. MH Vyas	1,100	94	Er. GR Patel	1,001
45	Er. DB Dalal	1,000	95	Er. GH Chitaliya	1,551
46	Er. AP Karode	1,111	96	Er. PB Mehta	3,000
47	Er. BP Dave	2,511	97	Er. MU Swadia	2,501
48	EI Technologies	5,000	98	Er. NM Pandya	2,100
49	Design Group Project	5,000	99	Er. MN Pandya	1,500
50	New Honeywell Engg.	5,000	100	Er. AN Pandya	1,500

Sr. No.	Member's name	Donation (Rs.)	Sr. No.	Member's name	Donation (Rs.)
101	Er. RH Vasavada	1,001	115	Servilink Engineers	10,000
102	Er. DM Vaidya	1,500	116	Er. MJ Desai	5,000
103	Well Wisher	1,000	117	Er. PA Shah	2,501
104	Er. VU Shah	2,000	118	Dr. Ruchi P Shah(Er. PAS)	2,501
105	Er. AJ Shah	1,111	119	Er.(Dr.) BG Desai	3,000
106	Advertisement	3,501	120		2,500
107	Er. MR Tilwalli	5,000	121	M/s SAP Enterprise	10,000
108	Windplus Pvt. Ltd.	5,000	122	Er. BT Dalwadi	2,000
109		2,000	123	Er. PB Parmar	1,111
110	Well Wisher (Er. UJ Parikh)	1,111	124	Er. KN Rathod	1,011
111	Er. VM Pathak	1,111	125	Er. CG Ramtirth	1,001
112	Er. Vimal Fire Controls	5,000	126	Er. JT Baxi	2,500
113	Er. MO Sheth	2,501	127	Er. RB Brahmbhatt	5,001
114	Er. PH Rana	1,001			

NEW LIFE / YEARLY MEMBERS ENROLLED

G.R. No.	Grade	Name	G.R. No.	Grade	Name
2359	LM	Bhavsar Sunil N	2368	LM	Patel Chirag K
2360	LM	Kothari Rachana S	2369	LM	Trivedi Jalpesh D
2361	Insti. LM	Yash Highvoltage Ltd.	2370	LM	Shah Mayur R
2362	LM	Rana Shreedhar V	2371	LM	Makwana Niravkumar N
2363	LM	Bhatt Gargey A	2372	LM	Rana Nikhilbhai R
2364	LM	Kamble Pramod M	2373	LM	Talajiya Falguni A
2365	LM	Hindia Vaibhav T	2374	LM	Mangroliya Divyesh G
2366	LM	Master Aman N	2375	LM	Rami Chiragkumar B
2367	LM	Jog Sidhdharth C	2376	LM	Chavda Kiritkumar C