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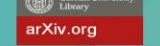
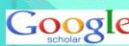
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A Deep Understanding on dripping out crude oil mechanisms of its obstacles and solutions with part of case study

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Abstract :-

In this article the basis mechanisms of tripping out of crude oil from oil wells by basic functions and introduction to crude oil its basic types and with examples of their fossils they found. Here its mainly associated with the working of Christmas tree (oil dripping machine), the function and effects of MUD and its formation and the dosing (in ppm) calculations.

Key Words :- Tripping, Christmas tree, MUD, Dosing in ppm

HIGHLIGHTS



Fig 1.1 Highlights of Article

Introduction and Basics Of Crude Oil

Crude oil :-

Basically mixture of hydrocarbons also consist of Sulfur, nitrogen and oxygen, it exist in liquid phase in natural underground reservoirs at atmospheric pressure.

Contents of crude oil in percentage :

- a. Carbon – 84 to 86 %
- b. Hydrogen – 11 to 14 %
- c. Other – S, O₂, N₂

Other main Contents :

i. Paraffins [Alkanes] :

Formula : C_nH_{2n+2}

$C_1 - C_3 \rightarrow$ Gaseous Form $\rightarrow$ Isomers doesn't form

$C_4 - C_{16} \rightarrow$ Liquid Form $\rightarrow$ Neobutane , Isobutane

$C_{17} - C_{30} \rightarrow$ Semi – Solid

Beyond $C_{30} \rightarrow$ Solid

They are stable and not attacked by H₂SO₄ or any oxidizing agent

Eg: Mostly Obtained from Bombay High

ii. Unsaturated Olefins [Alkene] :

Formula : C_nH_{2n}

$C_1 - C_4 \rightarrow$ Gaseous Form

$C_5 - C_{15} \rightarrow$ Liquid Form

Beyond $C_{15} \rightarrow$ Solid Form

Not attacked by H₂SO₄

iii. Acetylene [Alkyne] :

Formula : C_nH_{2n-2}

Ammounical solution of copper salts will use to get acetylene (crystalline solution)

Attacked by H₂SO₄

- iv. Diolefins [Alkynes]
- v. Napthenes [Alkenes]
Ring Saturated Compounds
It starts from C₅ compounds because C₂ and C₃ are not stable to form any compound.
- vi. Aromatics [Alkynes]
Unsaturated ring compounds
Benzene
Toluene
Xylene
[BTX]

Types of Crude oil :

- i. Heavy Crude oil < 20 – 21 ° API
Eg: Crude oil of Mexico
- ii. Light Crude Oil > 20 – 21 ° API
- iii. Sour Crude : Crude oil containing high amount of impurity and sulfur.
When total sulfur level of crude is more than 0.5%. eg – From Saudi Arab
- iv. Sweet Crude Oil : Crude oil containing small amount of hydrogen sulfide and CO₂ generally less than 0.42 % sulfur known as sweet crude
eg- Beeny Light Crude oil (Nigeria)
Girasal (Angala)
Murban (Abu Dhabhi)

Effect of Temperature on Crude oil : (W.R.T. Viscosity)

In general liquid crude oil tends to get thinner , When their temperature increases.

Oil tend to flow at higher temperature, Therefore by increasing temperature , Viscosity decreases .

Effect of temperature on crude oil : (W.R.T. Density)

In general liquid crude oil tends to expand when their temperature increases.

For eg: The boiling of same mass water at 100 °C than at 20 °C

Therefore as temperature increases density decreases.

Discovery and Research of Well :-

ONGC is India's Top Energy Company and ranks 20th among global energy majors (Platts). ONGC ranks 14th in 'Oil and Gas operations' and 220th overall in Forbes Global 2000. Acclaimed for its Corporate Governance practices, Transparency International has ranked ONGC 26th among the biggest publicly traded global giants.

In 1961 instrumental is transferring limited.

ONGC not only found new resources in assam but also establish new oil province in cambay basin.

ONGC went off-shore in early 1970s and found a giant oil field in form of Bombay high now known as Mumbai high till 1990.

Crude oil produced from Bombay High is considered to be of very good quality as compared to crudes produced in middle east. Bombay High crude has more than 60% paraffinic content while light Arabian crude has only 25% paraffin.

Role of Chemist for drilling oil field :-

Chemistry role starts from primary parameter only that to treat the oil and water from well which is found out from geo- physicists.

Now there is a team called at well site called drill team to place drill according to land conditions.

The chemists manufacture drill fluid called as MUD (a mud is the mixture of stabilizers, bentonite, solvents etc)

According to drill nature the hole should be made in different sizes and it becomes smaller as goes deeper like phase wise drilling, the sizes of holes are as follows in sequences:-

- i. 17 ½ inch hole
- ii. Quarter 12 hole
- iii. 8.30 inch hole

As the hole undergoes it must be filled with mud so the manufacturing of mud should be done in such a nature that as hole goes deeper the temperature and pressure conditions increases, so its properties should be defined like :-

Viscosity

Weight

pH

It should be checked according to the physical conditions of inner side of earth crust as hole made.

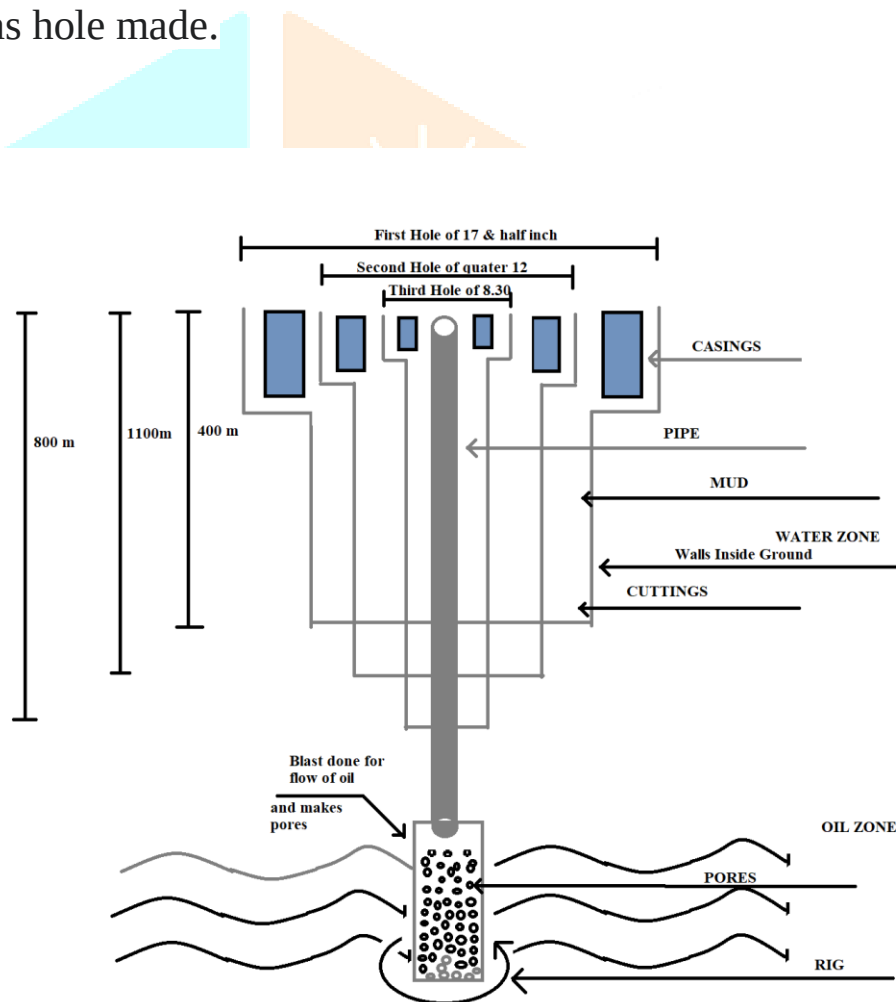


Fig 1.2 Example of crude drilling inside earth

Uses Of MUD (drilling fluid) During drilling :

- i. As per drilling process is continuous it creates cuttings of land which remains in the hole and as it makes blockage and afterwards cant allow to make hole further, so in order to bring out cuttings mud is added from side spaces as shown in figure 1.1

TO LIFT CUTTINGS

- ii. As to provide a function of lubricant, When mud added or introduced from bottom part it provides smoothing to bit so that it can rotate easily otherwise more heat introduced than collapse there only.

TO PROVIDE COOLING

- iii. As the liquid (oil) once came inside it has some pressure to come out as if pressure increases it comes out suddenly and this condition is called as blow out , so to counter pressure mud is used with particular weight. Due to some times loose formation if we add mud which goes inside and doesn't of use so we lose mud at this movement lose circulation materials are added with mud and also without mud which is use to counter this problem.

Eg : As a case happens in assam its pressure increases inside suddenly and that crude burns up till 84 – 85 days and then controlled by safety team. Hence particular characteristics of mud should be defined.

TO MAINTAIN HYDROSTATIC PRESSURE

Per day charge to drill is 15 – 18 Lakhs

- iv. As during drilling if constructed walls falls down or cracks takes place than ?
To counter this problem mud is added to inlet side spacings it makes a single thin sheet type border to make stable the walls or which protect walls to fall down.

TO MAKE STABLE WALLS

As mud is in solid form but it should make liquid form by mixing it with universal solvent water.

At some places more pressure are there inside ground so another oil based mixed mud is utilized.

Types of Installation :

1. EPS :- Early Processing System (Processing is done)

2. WHI :- Well Head Installation (Anklav site)

In this installation there is no treatment done only storage is done. Also having less capacity of storage

3. GGS :- Group Gathering System (Processing is done). It has large capacity of storage as compare to all.

4. CTF :-

There is one figure shown for complete arrangement of installation :-

In this direct storage also possible and indirect storage can also be done as shown in figure as another wells 8,9,10,11 are connected with WHI which directly goes to main installation GGS.

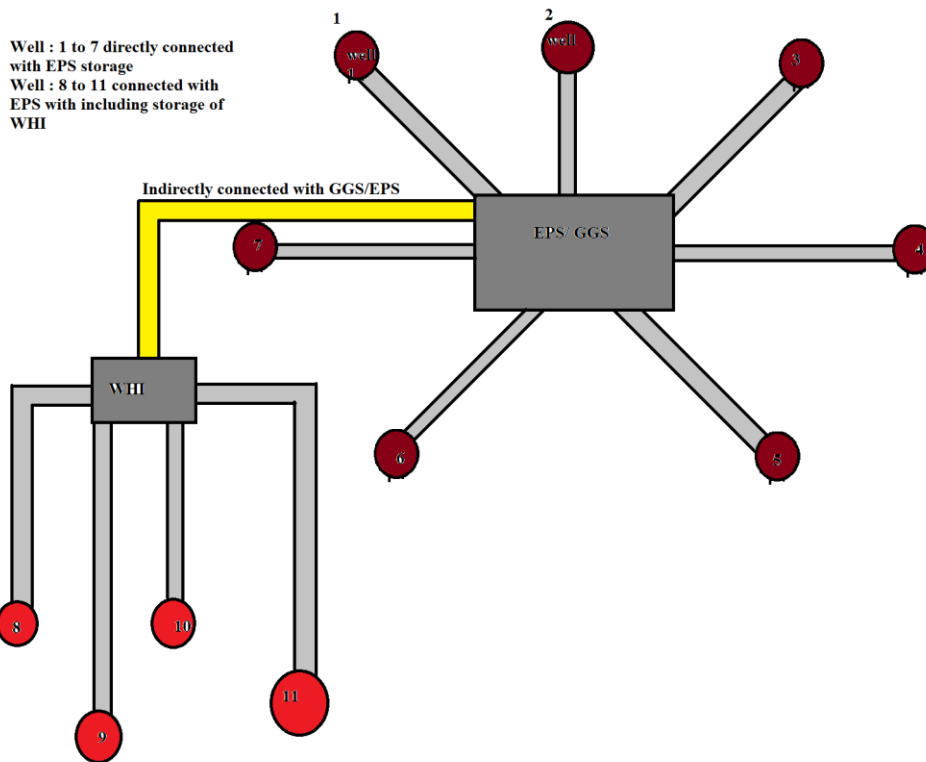


Fig 1.3 Storage Systems or Installation Arrangements

As for example if there is drilling of oil well found to be 10 well then success rate of getting oil is may be 3 or 4 not more than that. As per the survey of geological and geo-physicists.

The material of heavy weight drill pipes in the middle of the whole process is of steel material.

There is many types of mud cleaner assembly where mud is cleaned by filtration and can be recirculated to utilize another time.

In drilling there is one Christmas tree (Oil well)

The primary function of a tree is to control the flow, usually oil or gas, out of the well. (A tree may also be used to control the injection of gas or water into a non-producing well in order to enhance production rates of oil from other wells.) When the well and facilities are ready to produce and receive oil or gas, tree valves are opened and the formation fluids are allowed to go through a flow line. This leads to a processing facility, storage depot and/or other pipeline eventually leading to a refinery or distribution centre (for gas). Flow lines on subsea wells usually lead to a fixed or floating production platform or to a storage ship or barge, known as a floating storage offloading vessel (FSO), or floating processing unit (FPU), or floating production, storage and offloading vessel (FPSO).

A tree often provides numerous additional functions including chemical injection points, well intervention means, pressure relief means, monitoring points (such as pressure, temperature, corrosion, erosion, sand detection, flow rate, flow composition, valve and choke position feedback), and connection points for devices such as down hole pressure and temperature transducers (DHPT). On producing wells, chemicals or alcohols or oil distillates may be injected to preclude production problems (such as blockages).

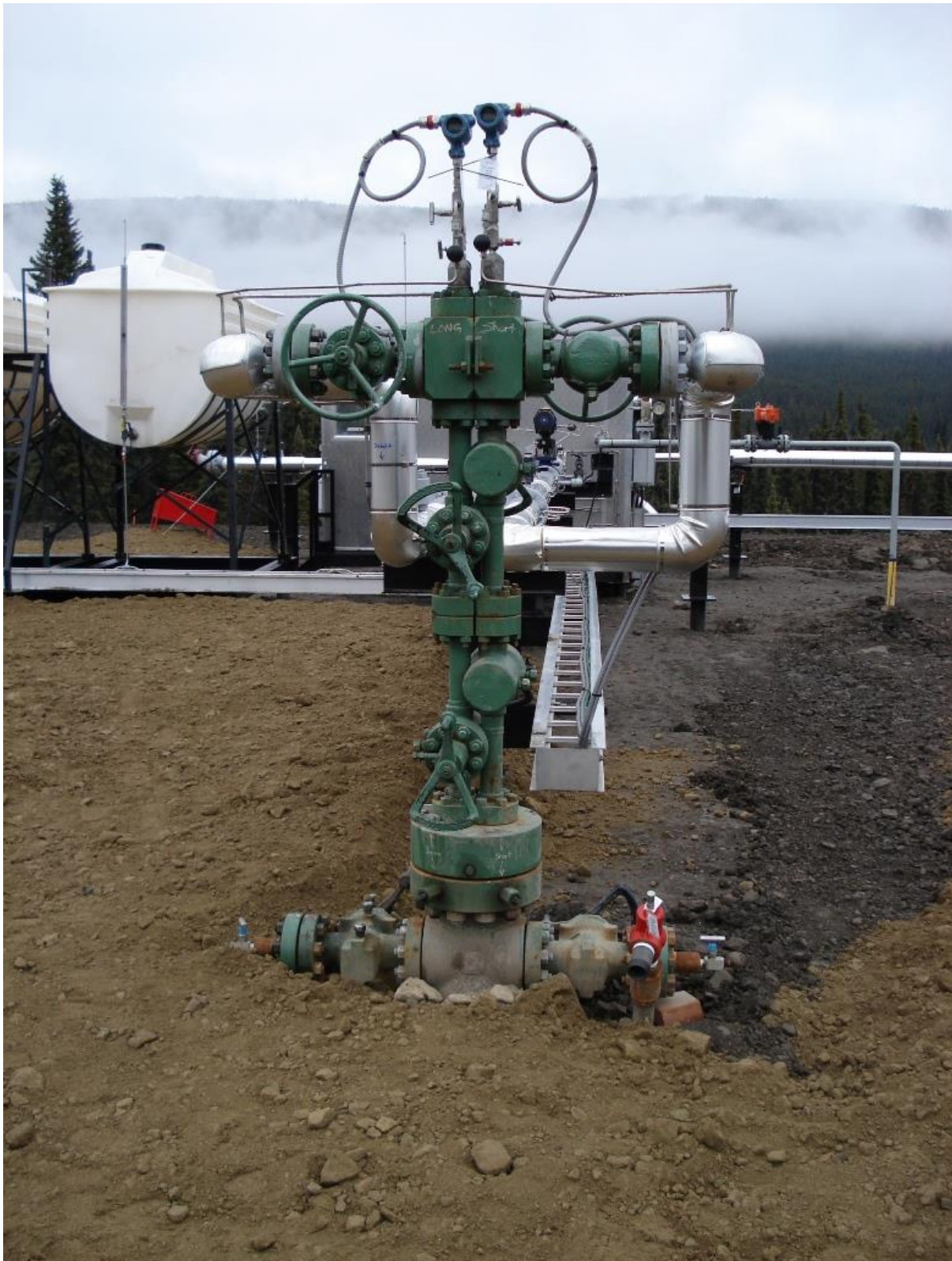


Fig 1.4 Oil Well (Christmas Tree)

After this discussion the main aims of all departments in this company is allotted in points like :-

- i. Find Oil well
- ii. Exploration (Chemist Department)
- iii. Drilling well
- iv. Production of oil
- v. Separation through GGS/EPS
- vi. Pump not required separated products to other refineries

Separated gas supplied to GAIL (Gas Authority Of India Limited) and other small refineries or local authorities.

In India major advantage for oil drilling companies is that the oil drilled from underground most of the part is sweet crude , means very less sulfur content hence doesn't require more treatment.

In production the major role comes at chemistry lab where the sample oil of different sites are brought and its quality monitoring is done in every decades.

Here oil and water treatment is done by different parameters.

The sites where ONGC had build drilling of oil are as follows :-

- i. Siswa Field
- ii. Nadiad Field
- iii. Ankla Field
- iv. Kathana Field (GGS)
- v. Akholjuni Field (GGS)
- vi. Vadatal Field
- vii. Padra Field (GGS)

At chemistry section there are many work to be done like sampling, Quality Monitoring, salinity of effluent water.

The main aim is to remove water from oil and according to norms of ONGC the oil should have less than 1% water in oil.

For eg :- 100ml crude than it should have 1 ml water.

As the well working starts and keeps on up till 15 to 16 years then may be well loses its formability of production of oil as if firstly production oil comes of 10m^3 but after 15 years it comes as 2m^3 so by looking over it also the well is designed or jobs designed that the works came from well services.

These type of problem occurs because as the pores in the sedimentary rocks which are connected with each other called permeability. There are two terms :-

- i. Porosity :- Empty spaces between rocks
- ii. Permeability :- The channels created between pores to pores where flow of oil takes place.

As shown in the figure 1.1 lower part.

The solvent also added inside the ground as to dissolve wax and other non required impurities. The last casing is called as production casing where two valves are provided one is at tube in and another at production casing. Some times permeability becomes decreases or down due to asphaltting contents. As to kill the well during solvent injecting or anu issue the another substances called NaCl or KCl are added by adding with water as like if we add mud at starting to counter the pressure.

Analysis Parameters :-

There are three types of analyzing parameters:-

- i. Water Analysis Parameters
- ii. Crude oil Parameters
- iii. Drilling Fluid Parameters

CRUDE OIL PARAMETERS

Water Content :-

Apparatus:-

- Heating Mantle
- Round Bottom flask
- Receiver
- Condenser
- Measuring cylinder

Chemical required:-

Toluene

Procedure:-

Take 50ml crude oil and add 50ml toluene in a round bottom flask.

Place the flask in heating mantle. Attach the receiver with flask and condenser. Heat the mixture up to 15 min or till all water from the crude comes into the receiver. Observer the level of water present in the receiver as X ml.

Calculation:-

Water Content = $X \times 2$ in % (v/v)

Bottom Sediment and water (BS AND W)

Apparatus:-

Centrifuge machine, Centrifuge tubes (100 ml), Heating mantle

Chemical:-

Toluene

Procedure:-

Take 50ml toluene in a centrifuge tube and add 50 ml crude oil in it. Agitate thoroughly for 15-20 times. Heat it up to 70°C. Place the tube into the centrifuge machine and rotate it at RPM for 10 minutes. Note the reading up to where the sediments and water have settled in to the tube (X ml).

Calculation:-

BS And W (%) = $X \times 2$

Mud Weight

The instrument used for measuring mud weight is Mud Balance. This consists of a cup, a graduated bar with sliding weight and fulcrum. The scale is graduated in four different units with the following ranges.

- Specific gravity (g/cc): 0.72-2.88
- Pounds/gallon (ppg): 6-24
- Pounds/ft³ : 45-180
- Psi/100 ft : 310-1250
- Mud weigh in lb/gallon (ppg) = $8.33 \times \text{Sp. Gravity (g/cc)}$

Procedure:-

Fill the mud in the cup and place the lid. Close the hole of the lid with finger and wash the cup thoroughly. Place the balance on the fulcrum. Adjust bubble of the leveller with sliding weight. Read the value.

Calibration:-

With distilled it should read 1.0g/cc, Sp. gravity. Mud balance can be recalibrated by unscrewing the screw at the end of the bar and adding removing the calibration lead shots.

Funnel Viscosity

The equipment used for measuring funnel viscosity is called 'Marsh funnel'. The funnel is conical in shape, 6 inches in diameter at the top and 12 inches long with a capacity of 1500 cc. A 10 mesh screen covers half of the top. The mud runs through the fixed office of 2 inches long and 3/16 inches diameter at the end of the funnel. A graduated cup to measure out 1 quart (946 ml) of the draining mud.

Procedure:-

Fill the mud in to the funnel cloning the office. Allow the mud to drain from the funnel in to the mug to fill 1 quart or 946 cc and measure the time taken in sec. Report viscosity in seconds.

Calibration:-

Funnel viscosity of water at 70 (+-) 5°F (21 (+-) 2°C) is 26 (+-) 0.5 seconds.

Oil, water and solid content by Retort kit

The equipment used is called oil water Retort kit. It has a sample cup of 10 ml capacity, a condenser, a heating system placed in insulator pf steel container. The contents are heated. Liquids evaporate, condense and are collected in graduated 10 ml cylinder. The solids are left behind in sample cup.

Procedure:-

Take out retort assembly out of the insulator, remove mud chamber or cup. Fill mud chamber with mud. Fit the assembly. Heat the content. Collect volume of liquid in the cylinder.

Calculation:-

MBC (cc)= ml of titrant solution/ ml of mud

Bentonite / clay (lbs / bbl) = 5* MBC

Bentonite/ clay (Kg/m3) = 2.853*5* MBC (cc)

DOSING CALCULATIONS :-

Conversion in to PPM

1 % Concentration in PPM

1 gm/L = ? PPM (mg/L)

$$= 1 * 10000$$

$$= 10000 \text{ PPM}$$

Same as 10 % = 100000 PPM

Step 1 :- Calculations of PPD (Pour Point Depressant)

Example :- 2000 PPD

Means 2000 mg in 1 L of Oil

Now what s it for 400 m³ (400 * 1000 L)

Given data :-

Dosing Concentration = 2000 PPM for 1 L of oil

For 400 m³ = How much PPD Required ?-----(i)

For 10 % = How much volume required ? -----(ii)

Solutions :-

$$1 \text{ L oil} = 2000 \text{ mg}$$

$$4000000 \text{ L oil} = ?$$

$$= 4000000 * 2000$$

$$= 8000000000 \text{ gm}$$

$$= 8000000 / 1000$$

$$\text{For } 400\text{m}^3 = 800 \text{ kg} \text{ -----(answer i)}$$

$$\text{For } 1 \text{ m}^3 = 1 * 1000 \text{ L}$$

$$= 1000 \text{ L}$$

As 2000 PPD in 1 L of oil

$$1 \text{ L} = 2000 \text{ mg}$$

$$? = 1000 \text{ mg}$$

$$= 2000/1000$$

$$= 2 \text{ Kg}$$

10 % of Solution = 10 gm in 100 ml

$$= 100000 \text{ PPM}$$

$$100000 = 1 \text{ L}$$

$$2000 = ?$$

0.1 Kg in 1 L = 20 L

Hence

2 Kg required -----(answer ii)

Another Sample Question :-

Dosing Concentration = 2500 PPM

For 200 ml of oil

At 1 m³

Required PPD -----(i)

At 10 % Required volume -----(ii)

Solution :-

2500 mg PPD in 1 L oil

1000 ml = 1 L

200 ml of oil = ?

$$= 0.2 \text{ L}$$

$$1\text{L} = 2500 \text{ mg}$$

$$0.2 \text{ L} = ?$$

$$= 500 \text{ gm} \text{ -----(i)}$$

10 % = 10 gm in 100 ml

$$100000 / 10^6$$

$$= 0.1$$

$$100000 \text{ PPD} = 0.2 \text{ L}$$

$$2500 \text{ PPD} = ?$$

$$2500 * 0.2 / 100000$$

$$= 0.005 \text{ L}$$

Want concentration in ml

$$1 \text{ L} = 1000 \text{ ml}$$

$$0.005 = ?$$

$$= 1000 * 0.005$$

$$= 5 \text{ ml required at } 1\text{m}^3 \text{ for } 200 \text{ ml} \text{ -----(answer ii)}$$

DIRECT METHOD FOR DOSING CALCULATION :-

$$M_1 V_1 = M_2 V_2$$

$$2500 \text{ ppm} * 200 = 100000 * V_2$$

$$V_2 = 500000 / 100000$$

$$V_2 = 5 \text{ ----- Volume required.}$$

Conclusion :-

From the above mention information its concluded that the method for drilling out of fluid with respect to the mud properties and its specific conditions meet the increasing global demand, However some issues with different outcomes can be taken out from previous system but its negligible.

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INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

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Covid 19 Pandemic and Child Sexual Abuse in Tamilnadu

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Abstract

Pandemic has generated a feeling of anxiety, fear and exasperation among children due to school closure, isolation and lack of support. Child abuse, exploitation and violence have also increased substantially during the lockdown (Child line & UNICEF, 2020). The situation of children living under institutional care is highly disconcerting. A World Health Organization report on global child abuse noted that schools were closed to 1.5 billion children worldwide because of the pandemic, and their parents face heightened stress and anxiety from lost income, social isolation, and potential crowding in the home. Additionally, more time online may expose children to a bigger nuisance of online sexual exploitation.

Preface

The impact of child abuse and neglect is often discussed in terms of physical, psychological, behavioral, or societal consequences; in reality, however, it is impossible to separate them completely. Physical consequences such as damage to a child's growing brain can have psychological implications such as cognitive delays or emotional difficulties. Psychological problems often manifest as high-risk behavior. Depression and anxiety may make a person more likely to smoke, abuse drugs or alcohol, or overeat. High-risk behaviors, in turn, can lead to long-term physical health problems such as sexually transmitted infections, cancer, or obesity. Furthermore, children who are abused are at increased risk of abusing their own children (CWIG, 2013).

Child sexual abuse (CSA) has been acknowledged as a severe public health distress. The World Health Organization (WHO) defines CSA as a coercive act with a child who is not capable of understanding or affording authority, leading to severe physical or mental damage. CSA includes Sexual exploitation is not rape alone. There can be many forms of sexual exploitation like clicking indecent photographs of children, making children watch pornographic content, physically teasing them, etc

Prevalence rates of CSA range from 8% to 31% for females and 3% to 17% for males. The highest rates have been reported for boys less than 18 years in Africa, i.e., 19.3% and for girls, in Australia, i.e., 21.5%. Asia has the lowest rates both 11.2% for girls and 4.1% for boys.

CSA is connected with an inauspicious impact on the child's usual progress and maturation. It too affects neurobiological systems and endocrinological profiles. Such interruption knowledgeable at some stage in the abuse has a lifespan convertible. . The CSA survivors are at a bigger hazard of increasing mental disorders. With reference to 37% of India's population encompassing children under 18, with a great percentage of them deficient in essential nourishment, education, and admittance to physical condition, approximately 53% of Indian children reported experiencing diverse kinds of maltreatment.

India leads the world as a country with maximum cases of child sexual exploitation. Statistics show that in India, every 155 minutes, a child under 16 years of age is raped. Parents of sexually abused children are scared to tell anyone due to fear of being shamed in society. It is not true that only strangers commit this crime. It can also be committed by members of the family, relatives and even neighbors. According to a survey, 90% of people sexually exploiting children are known to the children or are people whom the children trust. There have been many instances where the father himself, cousin brothers, uncle or neighbors have sexually exploited children. This shows that children need protection even while at home. They are afraid to mention this to anyone when it happens, probably out of fear of not knowing what has occurred. Sexual exploitation is not rape alone.

However, evidence shows that millions of children in India have been living under extreme poverty leading to poor nutrition, poor hygiene, cramped spaces for living and limited access to healthcare services. The susceptibility of children to COVID-19 is higher if they have limited access to healthcare for pre-existing co morbidities (Thompson & Rasmussen, 2020). Consequently, these factors put poor or vulnerable children at direr risk of experiencing consequences of COVID-19 than children in stable families. The economic crisis at the family level and loss of parents' income due to COVID-19 could push 117 million more children into poverty, amounting to 700 million children living in poor households by the end of the year in the absence of mitigating policies (UNICEF, 2020). Poverty has serious implications in terms of increasing child trafficking, forced labor and exploitation.

Integrated overview of statistics on the child rape cases in India has recorded 2113 cases registered in 2001 and 7112 cases in 2011. It is evident that there is increase of 336% of child rape cases from 2001 to 2018. In 2012, total number of child rape cases in India increased and was 8541 with Tamil Nadu contributing 3.42% and within Tamil Nadu, Tiruchirappalli district's contribution was 0.2%⁹ respectively. In 2013 total number of rape cases registered against children had a significant jump and it was 12,363 and Tamil Nadu's contribution was 3.39% and likewise Tiruchirappalli accounted for 0.4%¹⁰. The above statistics revealed in NCRB is only the tip of an enormous ice-berg called abuse against children. Since there was an alarming uptrend of human failure as

a secure society to protect its child from fellow humans, in 2012, to protect the rights of child victim from sexual offences during process of trial the legislation “The Protection of Child from sexual offences Act, 2012” was enacted adhering to the principles enunciated in CRC. Promisingly the National Crime Rate Bureau, a statistical listing unit of the crime rates in India had listed the POCSO Act, 2012, in its compendium 2014 for the first time. Cases registered under POCSO Act 2012 in the whole of India records around 8904 cases, with Uttar Pradesh, West Bengal and Tamil Nadu accounting for the majority of such cases with 3637, 1058, 1055 cases respectively. Likewise in 2015 cases there was an uptrend in the number of cases filed under this act i.e., 14762 cases, with Uttar Pradesh, Madhya Pradesh and Tamil Nadu again accounting for 3078, 1687, 1544 cases respectively¹¹. The most horrifying report is that 94.8% of rape cases involving children are by someone they knew, not strangers. These acquaintances include neighbors (3,149 cases) who were the biggest abusers (35.8%). 10% of cases saw children being raped by their own direct family members and relatives. Nearly half of all crimes against children in Tamil Nadu are sexual offences and their number has also gone up by 18% in 2017-18, according an analysis by Child Rights and You (CRY) of the 2018 National Crime Records Bureau (NCRB) data.

In the last five years Crimes against children in Tamil Nadu rose 25%, revealed the investigation. And, 49% of all the crimes came under The Protection of Children from Sexual Offences (Pocso) Act. The 18% rise in the number of sexual offences is almost double the national average of 9.9%. Christuraj Savarinayagam, advocate and child rights activist pointed out that this could be because of better reporting, “But the rate of crime is also worrying”. Perpetrators are getting smarter, tactful and finding new ways to abuse children. The state needs to be strong. Child protection systems in every village, town and city to combat such crimes,” Savarinayagam said.

A total of 4,155 crimes were reported against children in Tamil Nadu during the past one year, which accounts for 3% of the crimes against children reported across the country. Tamil Nadu is also one of five states that reported the most cases of procuring of minor girls. There has been a 95% increase in the number of cases reported in the state over a period of one year — 76 cases reported in 2017 and 148 cases in 2018. During this time, the national average declined by 10 %

It is really worrying to see Tamil Nadu recording so many crimes against children, especially under the Pocso Act. While education, awareness and community vigilance are key factors, more money flowing into child protection will be crucial to arrest this trend,” said Karthik Narayanan, regional director, CRY south.

The lockdown has seen a spear in the instances of domestic violence as women are trapped indoors with their abusers. And many children too are at high risk of facing abuse within their homes, say activists. Considering the severely underreported category of crimes that constitute child sexual abuse (CSA) inside families, they fear the lockdown has made both reporting and intervention next to impossible. “When we get a case of a child facing abuse from a family member, we first move them to a safe space, which is not possible now,” says Sherin Bosko, founder of rape crisis centre and NGO Nakshatra.

“With lockdown, the scope for incest crimes has gone up because both the perpetrator and the victim are forced to stay indoors.” Also, the usual allies that the child may find in friends or teachers at school are now inaccessible. Activists say often sexual crimes inside homes reach the police only after they’ve become medical emergencies.

Sakshi, an NGO educating youth to prevent CSA in their families and communities, has trained around 10,000 National Service Scheme (NSS) volunteers across the country and 1,249 in Tamil Nadu since the lockdown began. The 18 to 22 year olds are educated to identify symptoms of abuse in children within their families and neighborhoods. “The programme offers resolution mechanisms to the students to converse about this with two family or community members – one younger, one older. The older member becomes their ally to identify symptoms of CSA, break the silence, and call out the perpetrator,” says Smita Bharti, president and executive director, Sakshi. The signs to look out for include sudden behavioral changes in children if they have become unusually quiet, become scared of the dark, or started having nightmares. While these may seem innocuous, they do reveal that the child is troubled,” says Dr Aditi Kishore, south India head, Sakshi.

Conversely, officials at Child Line Tamil Nadu as well as the Chennai police say they haven't seen an increase in the number of CSA cases during the lockdown. A Child Line India data revealed that more than 6 lakh calls were received between March 20 and April 20, of which 18,217 calls required on ground intervention and 19% of these accounted for cases requiring protection from abuse, including sexual abuse, trafficking, abandonment and neglect. “While lockdown has limited the opportunities for the child to disclose the abuse should they choose to we must remember that all family members are constantly around now, so chances of getting abused could become slim,” says Vidya Reddy, founder of Tulir - Centre for the Prevention and Healing of Child Sexual Abuse.

Conclusion

Child abuse and maltreatment or neglect is serious problems that affect people from all walks of life all across the country. During the lockdown time there are evidences that children are fatalities of sexual abuse. They suffer several physical and mental injuries which could last a lifetime. In presence of law, the child sexual abuse will not end till the people is aware enough for the child emotional and physical healthiness need. Responsibility of care lies not only on parents but also on everyone. Mass wakefulness program beside with behavior change communication could be better solution during the Covid-19 pandemic. Preventive measures designed to ward off strangers (installing CCTV cameras and providing self-defence training) will be ineffective, as children do not know how to ward off unwanted sexual advances from their known relatives, acquaintances or workplace seniors, who they trust.

In addition UNICEF should suggest a suitable flow of information and services existing for defense of children from aggression, abuse, and ignorance during COVID-19 via text messages, educational platforms, and social media. Positive and nonviolent parenting guides are required to be provided to parents. Also UNICEF should more recommend child and family courts and juvenile justice boards to remain functional as an essential service. The require of the hour is to concern approach to assorted establishment for self-protective children from violence and abuse, which is inflicted upon them by their own family members, relatives, care takers, taking measures to make sure that counseling is set available to them. The NGOs Organizations which work in the field of child welfare need to be mobilized.

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INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

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Effectiveness of Online learning among the prospective teacher educators

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Introduction

Teaching is a profession that requires specialized knowledge and skills, teacher candidates, in order to perform their jobs, should possess certain competencies. To acquire these competencies teachers should be given special training before starting their profession. Teachers who will guide the youth and will be a factor in shaping the future should possess adequate competencies to perform their duties. Recently, teacher training has shifted from theoretical teacher-centered approach to practice oriented learner-centered approach. To provide an effective and self-regulating instruction in a learning-rich environment, teachers should be trained in teaching approaches and strategies.

Lockdown and social distancing measures due to the COVID-19 pandemic have led to closures of schools, training institutes and higher education facilities in most countries. There is a paradigm shift in the way educators deliver quality education—through various online platforms. Transitioning from traditional face-to-face learning to online learning can be an entirely different experience for the learners and the educators, which they must adapt to with little or no other alternatives available. In this latest trend of the education system, students are facing numerous challenges as switching from a traditional classroom, with face to face instructor training to computer-based training in a virtual classroom makes an entirely different and difficult learning experience for them.

NEED AND SIGNIFICANCE OF THE STUDY

The information of the twenty first century which has been brought about by advance in the computer technology has created an information society in which majority of labor force are expected to hold information related jobs. In these days the unpredicted growth of interactive multimedia and e-content play a prominent in the teaching field of education. In modern era the e-content plays a vital role in teaching The application of

teaching and learning methods that promotes deep and active learning and creativity in learners is the emphasis of the educational system of the present age. Teacher education, as a social institution must function according to the needs of the community, i.e., should nurture individuals that they educate to be creative and thoughtful with high academic ability. To achieve this objective, the traditional teaching methods (lectures, etc.) do not have the required effectiveness, but implementation of online-learning in teaching-learning process could be a way to realize this goal. Online-learning is one of the most important learning environments in the information era. Therefore, efforts and experiences related to this type of learning is given due attention around the world. E-learning can benefit self-regulation through the use of self-directed e-learning. The purpose of the current study is to have an overview of effectiveness of online learning among prospective teacher educators.

STATEMENT OF THE PROBLEM

Access to online learning resources has triggered a revolution in classroom settings from K-12 all the way up to postsecondary institutions. E-learning has become an invaluable resource to educators and classroom teachers, harnessing a new model of knowledge sharing wherein students possess the tools to learn at their own pace. This student-focused approach is unique in that students now share in their educational direction, maximizing both teaching resources and time. Online learning solutions provide much-needed effectiveness for teachers, allowing them to maximize the potential for individual learning curves and styles within the classroom. Many online learning solutions account for self-paced learning and allow students and teachers to work together to meet scheduled targets. Now more than ever, children, youth, and students are accessing information and news online, communicating, sharing, and exchanging ideas and concepts via technology. Online learning enables teachers to tap into this realm of constant learning by embracing the real-world application of theory through multimedia, video, chat, and interactivity. Educators can effectively harness the power of everyday technology to bring educational theories into the classroom. Online learning isn't just capable of empowering students to progress beyond the course expectations, it also encourages them to explore and learn ahead of the curriculum in a way that makes learning functional, relevant to today's growing inclusion of technology, and fun. So the Investigator intended to study the effectiveness of online learning of the prospective teacher educators and hence the study entitled as "EFFECTIVENESS OF ONLINE LEARNING AMONG PROSPECTIVE TEACHER EDUCATORS".

OBJECTIVES OF THE STUDY

The following objectives framed for the present study.

- i) To find out the effectiveness of online learning at M.Ed level.
- ii) To enhance the effectiveness of learning among prospective teacher educators through online.

Hypotheses

1. There is no significant difference in the mean scores of the control and experimental group **prospective teacher educators** in their Pre-test.
2. There is no significant difference in the mean scores of the control and experimental group **prospective teacher educators** in their Post-test.
3. There is no significant difference in the mean scores of the control group prospective teacher educators Above 30 and Below 30 years of age in their Pre-test.
4. There is no significant difference in the mean scores of the experimental group prospective teacher educators Above 30 and Below 30 years of age in their Post-test.

Research Method

In the present study Experimental method was adopted for its suitability and accuracy. In order to determine the effectiveness of online-learning, the researcher used pre -test and post- test experimental design. The sample consists of 40 prospective teacher educators studying M.Ed programme in Tamil Nadu Teachers Education University in Karapakkam, Tamil Nadu. They were selected as a sample by using simple Random Sampling technique out of them 20 students were in control group and remaining 20 students were in experimental group. All the students were equally matched in terms of their previous knowledge in Philosophy. The investigator conducted a pre test to assess the knowledge of the prospective teacher educators through an Achievement test. Then for the treatment, Audio, videos, powerpoint presentation and text materials were prepared for two units in the theory paper and was used in the online classes. The treatment was conducted for 30 working days. Then a post test was conducted. The data thus collected were statistically analysed..

Hypothesis Testing

Table 1

Mean scores of the control and experimental group prospective teacher educators in their Pre-test and Post-test

Test	Group	N	MN	SD	't' Value	'P' value	Level of Significance
Pre test	Control group	20	24.15	5.081	0.718	0.049	Not Significant
	Experimental group	20	23.20	3.037			
Post test	Control group	20	24.70	4.485	3.699	0.012	Significant*
	Experimental group	20	32.40	8.159			

The Table-1 shows that the calculated t-value 0.718 is lower than the critical value 1.740 corresponding to the 0.05 level of significance in the Pre-test. This implies that the control group and experimental group **prospective teacher educators** do not differ significantly in their achievement in the pre-test. Hence the null hypothesis **that there is no significant difference in the mean scores of the control and experimental group prospective teacher educators in their Pre-test** is not rejected.

The Table-1 shows that the calculated t-value 3.699 is higher than the critical value 1.740 corresponding to the 0.05 level of significance in the Post-test. This implies that the control group and experimental group **prospective teacher educators** differ significantly in their achievement in the post-test. **prospective teacher educators**

Table 3

Mean scores of the control group prospective teacher educators with age below 30 and above 30 in their pre test

Testing of the Group	Age	N	Mean	SD	't' – Value	'p'Value	Significance
Control Group	Below 30	13	21.85	3.997	-3.718	0.815	NS
	Above 30	7	29.17	3.971			

Table- 3 shows the calculated t-value -3.718 is lower than the critical value 1.740 corresponding to the 0.05 level of significance in the Pre-test. This implies that there is no significant difference in the mean scores of the control group prospective teacher educators Above 30 and Below 30 years of age in their Pre-test. Hence the null hypothesis that there is no significant difference in the mean scores of the control group prospective teacher educators Above 30 and Below 30 years of age in their Pre-test is not rejected.

Table 4

Mean scores of the experimental group prospective teacher educators with age below 30 and above 30 in their Post-test

Testing of the Group	Age	N	Mean	SD	't' – Value	'p'Value	Significance
Experimental Group	Below 30	8	36.50	8.468	1.969	0.408	S
	Above 30	12	29.67	6.998			

Table- 4 shows the calculated t-value 1.969 is greater than the critical value 1.740 corresponding to the 0.05 level of significance in the Post-test. This implies that there is significant difference in the mean scores of the experimental group prospective teacher educators Above 30 and Below 30 years of age in their Post-test. Hence

the null hypothesis that there is significant difference in the mean scores of the experimental group prospective teacher educators Above 30 and Below 30 years of age in their Post-test is rejected.

Findings of the study

1. There is no significant difference in the mean scores of the control and experimental group prospective teacher educators in their Pre-test.
2. The control group and experimental group prospective teacher educators differ significantly in their post-test.
3. There is no significant difference in the mean scores of the control group prospective teacher educators Above 30 and Below 30 years of age in their Pre-test.
4. There is significant difference in the mean scores of the experimental group prospective teacher educators Above 30 and Below 30 years of age in their Post-test

Discussion

The present investigation shows that the control group and experimental group prospective teacher educators differ significantly in their achievement in the post-test which corroborates with the study of Neema-Abooki , Alfred Kirigha Kitawi (2014), Madhu Sahni, Anju Sharma(2012) and Baig, Muntajeeb Ali, 2011. It is also found out that there is significant difference in the mean scores of the experimental group prospective teachers Above 30 and Below 30 years of age in their Post-test which was supported by the study of Alex van der Merwe (2007).

EDUCATIONAL IMPLICATIONs OF THE STUDY

1. The use of the e-content enhances the achievement; it will diminish wastage and stagnation in school.
2. Multimedia Technology can become an effective strategy in the class room teaching at M.Ed and B.Ed level.
3. Multimedia Technology enchances mutual understanding and co-operation among the students at all levels and in all subjects.
4. It provides the chance of learning to the students with the help of Multimedia.
5. The government can arrange training programmes for the teachers and teacher educators to develop e-content and use of online platforms.

Delimitation of the study

- In this, researcher used only e-learning materials for online learning.
- The study is carried out only 40 M.Ed students.
- The study carried out with the M.Edc first year students only.

➤ This study is limited to the M.Ed prospective teacher educators of TamilNadu Teachers Education University.

CONCLUSION

The rise of e learning and an electronic content is a new paradigm for education and training in the knowledge society. It is empowered by technological advancements, which gives the modern instructional technology. The development of e-content in the changing times has become major responsibility of the modern teacher who has to face a new learner in a new environment. The role of qualitative e-learning material like e-content assumes critical necessity and value to boost and spread modern instructional technology. However, the development of e-learning material like e-content is not any easy task. We should keep an eye on the various stages of the e-learning material development to ensure whether the developed content is valid and suits to the needs of the learner.

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INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

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STUDERE SYSTEM

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ABSTRACT:-

As we all have come across the earlier situation of how the management of student information example: records of students, results of students etc. took a lot of time and energy. People used to spend days in order to manage the records and maintain the files properly. Lots of chaos used to happen. Students and teachers were required to meet again and again to know and ask anything.

In such a severe condition it has become very important to do things online so that the lives of teachers and students do not get infected by this hazardous pandemic disease and also the work that one was unable to do due to this pandemic can easily sit at home without any fear of becoming corona positive and do the work in a more safe and easy manner.

So the solution to this problem in this COVID time period is the newly designed Studere system (SS) which is a simple interface that provides the option to manage student information in a proper way. Due to its development nowadays, it can be used by many educational institutions or colleges or even in schools to easily manage the records of students.

Studere System(SS) is able to deal with the activities information from the proposal application stage until the end which includes tracking of attendance, student academic reports, student information, student college details, student course details, student curriculum activities, student batch details, student score management, generating reports for administrative purposes and many such things.

Overall the studere system is the system which is used to manage all the details of the student online. It is very easy for the teachers and students to view necessary details without any intervention . As we all know, in this busy world today time is very important for everyone. Earlier when things were not online it was just a waste of time for the teachers and the students to reach out regularly to ask or to know anything, but now the earlier problems are solved and lot of time is saved as it has become an easy task for both the teachers and the students to ask and know things online only because of the help of studere system .

The way this system is designed is quite appreciable because with help of SS teachers students can know everything whatever they are in need to know from them very easily.

This is easy to understand and use. The integrated database application is developed in such a superb way that it reduces the lot of precious time that is spent on administrative tasks. This system is also error free and very efficient in its work and less time consuming. These facilities that one can enjoy on this system are all because of the extra care and hard work taken to build it .

Keywords: Studere System, student, online, automation, forms.

INTRODUCTION:-

In this advanced world today many things are being developed and designed to resolve the earlier problems faced. With technology and time advancement, it is essential for rapid information dissemination [8]. But as we all are aware that the latest Coronavirus disease (COVID-19) outbreak also has altered the higher education landscape on the learning delivery and the students' co-curricular activities. Such students' activities are targeted at strengthening the students' comprehension, developing the students' coping skills, helping them cope with stress, and offering extra opportunities to improve their employability [7].

In Today's scenario we all know that things are going online and very little paperwork is done in the schools and in the universities. So we need something that manages all our daily basis paperwork online where we do everything as we are doing on the paper [11]. That something includes either an Application or else a website where we are able to do the things online. So, my team and I created a STUDERE SYSTEM to manage the student data in an effective and efficient manner. In this an authorized user is logged via registered mail id and password, it may be a student or the authorities of the University.

Under these circumstances , the implementation of SS and the design of SS is only to replace or to reduce the current problems and the paper-based scenario [12]. With the help of SS the college faculties are directly able to access the details of students like their academic progress, attendance details, and report cards, and many more things.

All the information or data of the student is reviewed and updated in the database of the server before the data gets changed. All the information is uploaded on the server and accessed and managed by the college administrator and there is no read-option available for the students. Administrators can alter the data, validate the data, remove the data or insert the data as it has all the permissions. And on the other hand, the student has an option to raise his query in front of the subject teachers as well as in front of higher authorities [4]. This SS system provides a simple user interface for the use case of students as well as for the authorities.

The SS system has a very simple interface to maintain the data of the student. We cannot achieve this objective by pen and paper as the data might be scattered and can be written to many places and most of all it is very time-consuming to do paperwork [13]

All the above issues are resolved by using the Studere System (SS) which provides the online interface for the faculty, students, etc. If we increase the efficiency of college data management automatically, it decreases the time taken to access the student data or to deliver the student data. To make the system more secure, reduce the time spent on non-value-added tasks [6].

This data or information basically includes all student's background information, courses taken by the student, student attendance, grades of student, student performance record, and much other student information needed by the college or university. Studere System deals with all kinds of student details, student academics related reports cards, student college details, courses taken by students, student curriculum activities, student batch details and many other related details too. It have all the details of a student from the day one to the end of his college journey which can be used for reporting purposes, for attendance [5],

student progress in the course taken, completion of semesters or years, upcoming semester year curriculum details of the students, students exam details, students project or assignment details, students final exams results, and all of these information will be available for future too [9].

As we all know that the Information plays a very vital role in the development and growth of any college, institution or university. As we see currently, the different departments manage student data independently according to their own ways. There are no same standard processes or programs for capturing and processing or to store student's information in the database [15].

The system was fully developed by using the following languages like Laravel, HTML, CSS, BOOTSTRAP, JS, and for the database we are using POSTGRES.

All the steps of the application development cycle are employed successfully. It updates the PostgreSQL database on a day to day basis.

Review Of Related Literature:-

The problem in management of student data on the paper is very huge. As it is very hard to manage the data of thousands of students on paper on a daily basis. By reading the earliest published paper we came to know that a huge amount of data is impossible to manage on paper so we need a database management system that is why we are creating a Studere System which is basically used to manage the data of schools, colleges or universities online[1,2].

All the data of schools, colleges or universities are stored in the database which is only accessed by the authorized user whether it is a student or it is an authority person. In our case we are using the PostgreSQL database for our project named as Studere System [2,3,8,10].

As we also came to know that the data was altered in the previous created student database management system but in our case it is safe as only authorized person is allowed to login and perform operation read and write in the database and also the login and logout history is automatically get printed or in the other words we can say that automatically saved in the log history [4,11,12].

The Studere System is highly efficient and effective to use rather than using paper for managing the student data as we are using HTML, CSS, BOOTSTRAP, JAVASCRIPT for the Front-end and LARAVEL and MVC for the Front-end and Back-end and PHP, POSTGRESQL for the Back-end [5,7].

PostgreSQL is a powerful, open source object-relational database system with over 30 years of active development that has earned it a strong reputation for reliability, feature robustness, and performance. It is very easy to understand, learn and to fetch the data from the database according to our need from the specific table without altering the other tables in the database [2,3].

METHODOLOGY & IMPLEMENTATION:-

Studere System is a unique, user-friendly, and quite effective project for the management of students. And to make this happen we have used various technologies for different elements in unique methods. What's working in the background is listed down below:

Front-end:

1. HTML:- Firstly, the structure of the website is designed by HTML. HTML stands for Hypertext Markup Language. It is the basic building block of the website. Everything which is assigned at its place is done by the use of HTML.
2. CSS:- Secondly, we have used CSS for the styling of our website. CSS stands for Cascading Style Sheets. By using it creatively one can provide an attractive look to any website.
3. Bootstrap:- Then we have used Bootstrap which is a framework that makes the user interface of the website user-friendly and attractive. It is lightweight, customizable, and also contains a responsive structure and style.
4. JavaScript:- Apart from the above we have also used JavaScript here, which is a scripting language that allows us to implement complex features on a webpage like displaying timely content updates, interactive maps, animated 2D/3D graphics, scrolling video jukeboxes, etc.

Both Front-end & Back-end :

1. Laravel:- Here firstly we have used Laravel which is a web framework that is used for building customized web applications using PHP. Laravel is the most important component of our project as it makes our project unique and different from the already existing student management systems.
2. MVC:- We also used MVC in Laravel. It is also a framework. MVC stands for Model-View-Controller. It is an architectural pattern that separates an application into three main logical components Model, View, and Controller.
 - a. Model:- The model component stores data and its related logic. It represents data that is being transferred between controller components or any other related business logic. It responds to the request from the views and also responds to instructions from the controller to update itself. It is also the lowest level of the pattern which is responsible for maintaining data.
 - b. View:- A View is that part of the application that represents the presentation of data. Views are created by the data collected from the model data. A view requests the model to give information so that it resents the output presentation to the user.
 - c. Controller:- The Controller is that part of the application that handles the user interaction. The controller interprets the mouse and keyboard inputs from the user, informing the model and the view to change as appropriate. A Controller sends commands to the model to update its state. The controller also sends commands to its associated view to change the view's presentation.

Back-end:

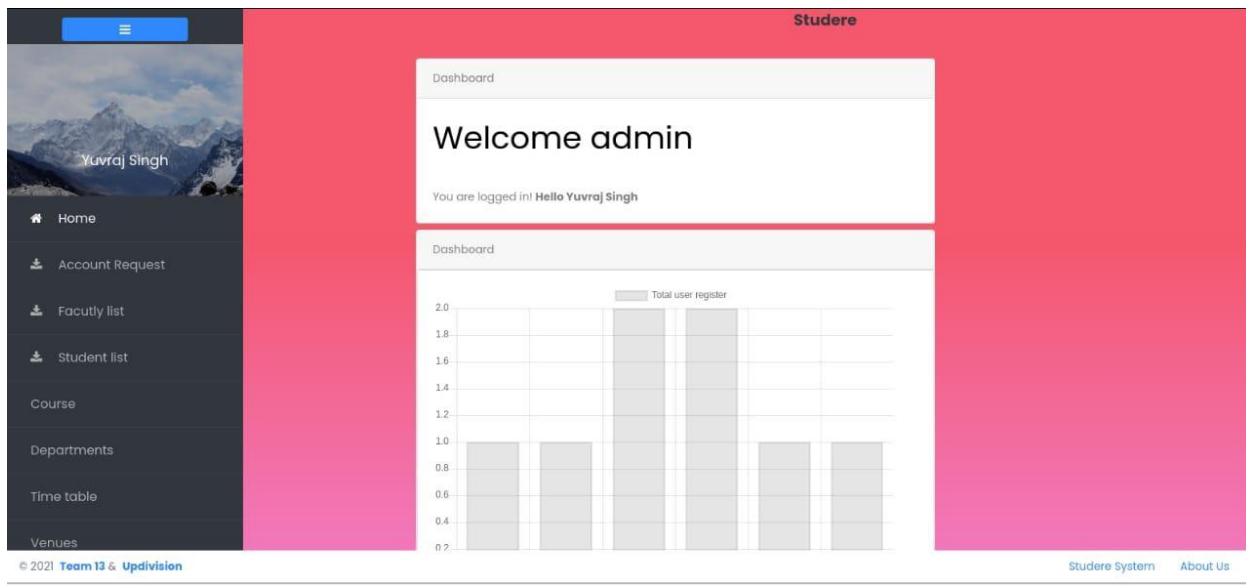
1. PHP(Hypertext Preprocessor):- Here in the Back-end we have used PHP. Which is a server-side scripting language. It sends the output to the client which is processing on the same server. Here when a request is filed the PHP sends the resources back to HTML for sake of processing. It helps in managing dynamic content, databases, session tracking, and even for building an entire e-commerce site. It consists of several popular databases, including MySQL, PostgreSQL, Oracle, Sybase, Informix, and Microsoft SQL Server.
2. PostgreSQL:- Last but not least the most important part of any database management system is the database itself which in our project is PostgreSQL. We have used PostgreSQL because

it is an advanced and enterprise-class open-source relational database that supports both SQL (relational) and JSON (non-relational) querying. PostgreSQL's write-ahead logging makes it a highly fault tolerant database. It is ACID compliant, and has full support for foreign keys, joins, views, triggers, and stored procedures, in many different languages.

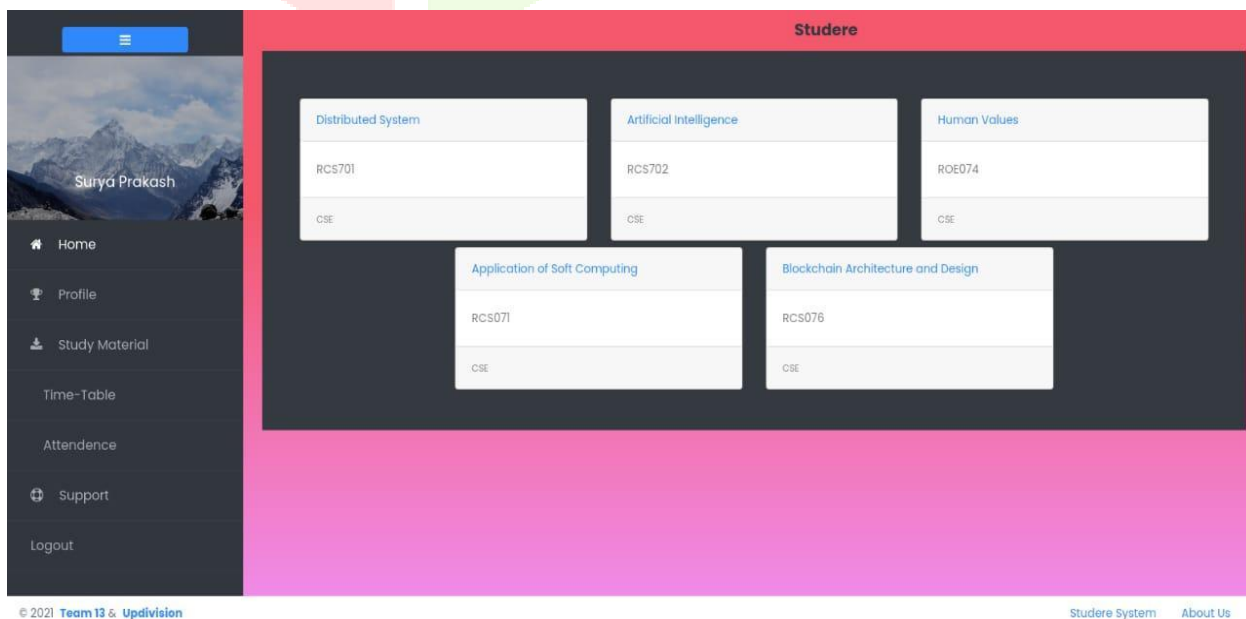
RESULTS:-

Following are the some result of our project :-

1. Admin Page :



2. Study Material Page:



3. FACULTY SELF ATTENDANCE:

Self Attendance Student Attendance

< > today

May 2021

month week day

Sun	Mon	Tue	Wed	Thu	Fri	Sat
25	26	27	28	29	30	1
2	3	4	5	6	7	8
9	10	11	12	present	present	15
16	17	18	19	20	21	22

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4. SUPPORT AND ENQUIRY:

Studere

Get in Touch

Address:
Krishna Engineering College
95, Loni Road, Between Mohan Nagar & Air Force Station-Hindon,
Ghaziabad, UP 201007

Helpline number:
7007229694

E-mail:
yuvisingh1999@gmail.com

Website:
studeresys.com

Enquire

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CONCLUSION:-

Studere System is not just a student database management system, it is way more than that. As managing anything is quite difficult for many and hence the work starts to pile up, this system will help to get rid of such problems because this system is fast, hassle-free, and easy to use. Not only storing is easy here but getting information about a particular student is also way easier. Apart from all such features this system also manages to maintain the data in a sorted manner which makes it handy for both teachers as well as students. This system makes a profile for each and every student which makes it unique and different from the already existing student database management systems. The profile can only be accessed by the student himself, the administrator, and the faculty members. Every profile contains all the information about the student that is his name, course details, and contact details. Apart from the profile this system also contains a timetable generator and attendance marking system. Timetable generator is managed by the faculty members so that it can be easily accessed by the students.

Only the faculty members will be able to mark the attendance in the attendance marking system but the students can also view their attendance. It also consists of a calendar generator which further helps in keeping a track of the upcoming events.

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DETERMINATION OF LC₅₀ OF FRESHWATER FISH, (*TILAPIA MOSSAMBICUS*) WHEN EXPOSED IN ZINC

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Abstract: The fishes were exposed in different concentration of zinc for different time intervals to study of lethal toxicity of zinc. The lethal concentration prepared from the stock solution (0.2mg, 0.4mg/lit, 0.6mg/lit & 0.8mg/lit respectively). the fishes was exposed in 0.2, 0.4, 0.6 & 0.8mg/lit for 24 hrs, 48 hrs, 72 hrs and 96 hrs. The highest mortality was observed in 48 hrs followed by 96 hrs. The LC₅₀ value was 0.190 mg/lit for 72 hrs. Consequently we observed and record all morphological & behavioral changes after each successive time intervals.

Index Terms - Zinc, *Tilapia mossambicus*, lethal Concentration, morphological behavioral changes.

I. INTRODUCTION

Fish living in metal polluted environments might either be exposed to metals through the food chain, or via direct uptake from contaminated water. The gills are the first organs to suffer from this kind of pollution and will show the first clinical signs induced by waterborne metal exposure Guo et. al. (2018). Copper and zinc are essential nutrients for fish and therefore dietary or waterborne intake of these elements is necessary to sustain basic metabolic processes, in contrast to xenobiotic metals such as cadmium Wood et. al. (2012). However, elevated concentrations of zinc will also lead to adverse effects on a wide range of crucial pathway. Prolonged elevated zinc uptake will eventually lead to critically high zinc accumulation in tissues where it can generate damaging reactive oxygen species Loro et. al. (2012). Pollution of the aquatic environment with heavy metals has become a serious health concern in recent years. These metals are introduced into the aquatic ecosystem through various routes such as industrial effluents and wastes, agricultural pesticide runoff, domestic garbage dumps and mining activities (Merian 1991). Among aquatic organisms, fish cannot escape from the detrimental effects of these pollutants, and are therefore generally considered to be the most relevant organisms for pollution monitoring in aquatic ecosystems (van der Oost et al. 2003).

Zinc (Zn) is one of the most important trace metals in the body, and participates in the biological function of several proteins and enzymes (Maity et. al. 2008). Despite being an essential trace element, Zn is toxic to most organisms above certain concentrations (Ho, 2004). Since the range-finding acute test is conducted to pinpoint exposure concentrations; the definitive acute test is firstly conducted to estimate LC₅₀ of the chemical to which organisms are exposed (Rand, 2008). Several fishes are used as test organism for toxicological studies. In the present studies freshwater fish, *Tilapia mossambicus* used as test organism for evaluation the impact of Zinc. Consequently, the objective of this study is to assess the responsiveness of *Tilapia mossambicus* to Zn through determination of acute 96 hrs LC₅₀ value and behavioral responses induced from exposure to different Zn concentrations.

II. MATERIAL AND METHODS

The freshwater fish, *Tilapia mossambicus* procured from Govt. fish hatchery at Nanded. Prior to the experiment, fish were acclimatized for 2 weeks in 14 40-L glass aquaria under laboratory conditions 10 fish per each aquarium. The continuous aeration was maintained in each aquarium using an electric air pumping compressors. Fish were fed daily on commercial fish diet. The heavy metal Zn in the form of zinc sulfate anhydrous was used in the present study. The acute toxicity test was performed for 4 days in which two replicates of four different Zn concentrations (0.2, 0.4, 0.6 & 0.8 mg/L) were used (10 fish for each aquarium). At 24 hrs, 48 hrs, 72 hrs and 96 hrs, fish dead were counted in the different Zn concentrations. No mortality was observed among control fish. Simultaneously we observed and record the morphological changes and mortality of fishes in each hour. Fishes was to sacrifice at each 24 hrs till the 96 hrs. Isolate the tissue like muscle, liver & kidney in distilled water for biochemical analysis and another set was used to histopathological analysis. The blood was collected directly by heart puncture and stored into two tubes. The one tubes containing EDTA as an anticoagulant for serum analysis and another for hematological parameters. The calculation of LC₅₀ values was done by online system through the four parameters logistic equation, which

corresponds to the dose-response curve with the slope of the variable slopes (AAT Bio quest Inc. (2018). Quest Graph, LC50 Calculator. <https://www.aatbio.com/tools/lc50-calculator>.

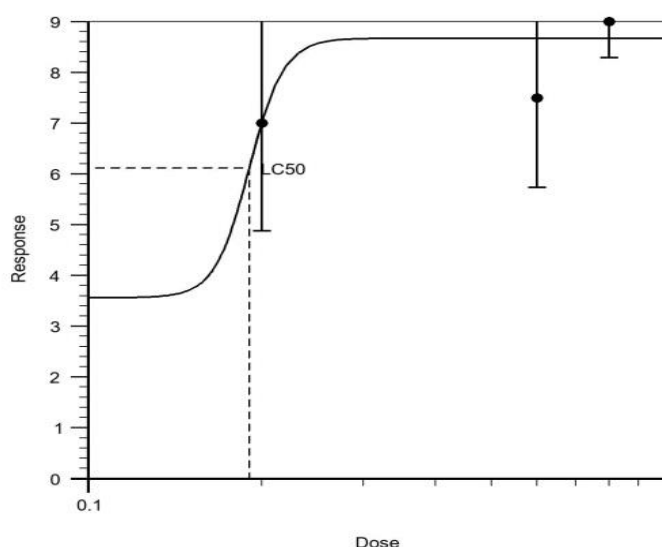
III. RESULTS AND DISCUSSION

In the present investigation when fresh water fish exposed in four different concentration 0.2, 0.4, 0.6 & 0.8 mg/lit for different time intervals. In the first 24 hrs (0.2mg/lit) the rate of mortality of fishes was observed 4%. The highest rate of mortality was observed in 48 hrs (0.4mg/lit -09) followed by 96 hrs (0.8mg/lit 08). The fifty (50%) percent mortality rate was observed in 72 hrs for (0.6mg/lit 05) the LC50 value was obtained 0.190 mg/lit. for 72 hrs. the results is summarized in table no.1 and graph no.2

Table no.1

Showing the rate of mortality of freshwater fish, *Tilapia mossambicus* when exposed in different concentration for different time intervals

Time	Concentration in mg/lit	Number of animal Exposed	Number of animal dead
24h	0.2	10	04
48h	0.4	10	09
72h	0.6	10	05
96h	0.8	10	08



Graph:1

Showing rate of mortality of fishes *Tilapia mossambicus* when exposed in various concentration of Zinc for different time intervals by using dose response relationship curve equation.

It is known from literature that typical 96-hr LC50 concentrations of zinc for fishes are 1 to 10 mg/lit. in soft water and 3 to 20 mg/lit. in hard water (Spear, 1981). The major modifying physico-chemical factors of Zn toxicity are hardness, and pH of water (Alabaster, Lloyd, 1980; Spear, 1981; Bradley, 1985). Acute lethality of dissolved Zn increases with decreasing water hardness and increasing pH, carbonate alkalinity having limited influence (Holcombe, Andrew, 1978; Spear, 1981; Bradley, Sprague, 1985; Cusimano et al., 1986). In the present investigation the toxicity of zinc for *Tilapia mossambicus* was 0.190 mg/lit for 72h. Similar results was observed in another studies and reported that the 96-hr LC50 values in soft water (25-44 mg/litre as CaCO₃) were from 0.066 mg Zn/lit (Cusimano et al., 1986) to 0.91 mg Zn/litre (Herbert, Shurben, 1963). On the other hand, in hard water (179-350 mg/litre as CaCO₃) they amounted from 2.5 (Holcombe, Andrew, 1978) to 7.21 mg Zn/lit depending on fish size and test conditions. In very hard water (500 mg/litre as CaCO₃) derived 48-hr LC50 value for rainbow trout was, however, equal to 4.76 mg Zn/litre (Solbe, 1974). Derived LC50 values for other salmonid fishes such as *Salmosalar* (Sprague, 1964), *Salmo clarki* (Rabe, Sappington, 1970), *Oncorhynchus nerka* (Chapman, 1978), *Salmo trutta* (Nehring, Goettl, 1974), *Salvelinus fontinalis* (Holcombe, Andrew, 1978) completely got into the ranges for rainbow trout.

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A Study to Assess the Knowledge Regarding Strategies under Revised National Tuberculosis Control Programme among ANM Students, Selected Nursing Colleges, Meerut.

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ABSTRACT

Background-

India is the highest TB burden country in the world and accounts for

Nearly one fifth (20%) of global burden of tuberculosis. Every year, approximately

1.8 million persons develop tuberculosis, of which about 8,00,000 are infectious and

Until recently, 3,70,000 cases died of it annually. In India, today, two deaths occur

Every three minutes from tuberculosis, but these deaths can be prevented with proper

Care and treatment. Tuberculosis remains a worldwide public health problem despite the fact that the causative organism was discovered more than 100 years ago and highly effective drugs and vaccines are available making tuberculosis a preventable and curable disease. Under the Revised National Tuberculosis Control Programme (RNTCP), directly observed short course treatment (DOTS) is a comprehensive strategy for tuberculosis control and has proven effective in controlling tuberculosis on a mass basis.

Objective of study-

1. To assess the knowledge regarding strategies under Revised National Tuberculosis Control Programme among ANM students of selected nursing colleges, Meerut.
2. To find out association between knowledge regarding strategies under Revised National Tuberculosis Control Programme with their selected demographic variables.

Material and Method- A descriptive survey study was conducted. The research design selected for the study was Descriptive research design and qualitative research approach was followed. A sample randomized sampling technique was used for selection of 100 ANM students, selected nursing colleges, Meerut. Data collection was done by a structured questionnaire using online survey method to assess the knowledge regarding strategies under Revised National Tuberculosis Control Programme as per the objectives. Data analyzed by descriptive and inferential statistics. Frequency and percentage was done for sample. Chi-square was used to assess the association between knowledge score and demographic variables

Results- The sample characteristics of ANM students of selected nursing colleges, Meerut the maximum number of 65% were the age group of 17-22 years, followed 29% were the age group of 23-27 years and 6% were 27-31 years respectively.

Data presented in table 1.1 and pie charts shows the following findings:

- Majority of the samples 65 %(65) students belongs to age group of 17 to 22 years followed by 29 % (29) students who belongs to age group of 23 to 27 years; and only 6 % (6) belongs to age group of 27 to 31 years.
- As regards the year of course samples were distributed uniformly with 51% ANM first year students and 49% ANM second year students.
- As regards the area of residence samples were distributed uniformly with 46% ANM students residing in urban areas and 54% ANM students residing in rural areas.

- As regards the family history of tuberculosis, majority of the samples 68% were not having any previous history of tuberculosis in the family in contrast with 32 % of samples having previous history of tuberculosis in the family.
- As far as the source of knowledge regarding RNTCP is concerned, majority of the sample 73% responded that they acquired knowledge from health personnel, followed by peer group 12 %, printed media 10% and electronic media 5 %.

There was a significant association between knowledge score regarding strategies under Revised National Tuberculosis Control Programme and source of knowledge about RNTCP. The obtained chi square value 36.76 at $P > 0.05$ is significant

Conclusion-The study concluded that there was a significant association between knowledge score regarding strategies under Revised National Tuberculosis Control Programme and source of knowledge about RNTCP. The obtained chi square value 36.76 at $P > 0.05$ is significant

Keywords- ANM students, knowledge, Strategies under Revised National Tuberculosis Control Programme



Nanonization Of Zinc Oxide By Top-Down Approach For Multiple Applications

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ABSTRACT:

Nanoscience and nanotechnology are the study and application of extremely small objects, and they can be applied in chemistry, biology, physics, materials science, and engineering, among other subjects. The exceptional physical and chemical properties of zinc oxide nanoparticles (ZnO) provide advantages. It is a low-cost material used in the cosmetics sector, nanofertilizers, and electrical devices, as well as a good agent for bioimaging and targeted medication and gene delivery, as well as an excellent sensor for detecting environmental toxins and remediation.

A disinfectant made from newly synthesised zinc (II) oxide nanoparticles (ZnO-NPs) has been tested. For the developing corona virus, a nano-spray has been developed (SARS-CoV-2). Various spectroscopic analysis (FT-IR, UV, and XRD) and surface analysis techniques were used to completely chemically analyse the produced (ZnO) nanomaterial. This review focuses on ZnO-NPs, which have potent antiviral activity against SARS-CoV-2 at very low concentrations and can trigger many free radicals, causing oxidative stress to SARS-CoV-2 and severe damage to SARS-CoV-2 cellular membranes, which is a critical result in the fight against SARS-CoV-2.

Inorganic physical sun blockers such as titanium dioxide (TiO₂) and zinc oxide (ZnO) are commonly used in sunscreens. The combination of TiO₂ and ZnO ensures broad-band UV protection since TiO₂ is more effective in UVB and ZnO is more effective in UVA. Microsized TiO₂ and ZnO have been increasingly substituted with TiO₂ and ZnO nanoparticles (NPs) (100 nm) to address the cosmetic issue of these opaque sunscreens. This paper examines the considerable impact on sunscreen UV attenuation when microsized TiO₂ and ZnO particles are substituted with NPs, as well as the physicochemical factors that influence NP sunscreen effectiveness and safety

Key Words: Zinc oxide Nanoparticles (ZnO-NPs), Sunscreen, Coronaviruses (CoVs), Nanotechnology, Disinfectant.

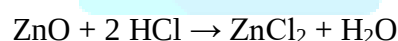
INTRODUCTION

Zinc oxide has the formula ZnO and it is an inorganic substance. Rubbers, plastics, ceramics, glass, cement, lubricants, paints, ointments, adhesives, sealants, pigments, meals, batteries, ferrites, fire retardants, and first-aid tapes all contain zinc oxide, which is a white powder that is insoluble in water. Although it occurs naturally as the mineral zincite, most zinc oxide is produced synthetically.



Figure No 1. Zinc Oxide Powder

Pure ZnO is a white powder, but in nature it occurs as the rare mineral zincite, which usually contains manganese and other impurities that confer a yellow to red color. Zinc oxide is an amphoteric oxide. It is nearly insoluble in water, but it will dissolve in most acids, such as hydrochloric acid. ^[1, 2, 3]



Solid zinc oxide will also dissolve in alkalis to give soluble zincates:



Introduction to Nanotechnology

NANO & TECHNOLOGY: In the metric system, A nanometre is a unit of length equal to one billionth of a metre (10^{-9}).

Technology is the creation, application, and understanding of tools, machines, and processes to solve a problem or carry out a specified purpose.

Nanotechnology is defined as the study and use of structures between 1 nm and 100 nm in size. To put that in perspective, it would take 800 nanometer particles lined up side by side to equal the breadth of a human hair.

While this is the most widely accepted definition of nanotechnology, researchers with different areas of interest have slightly different definitions. ^[4]

History

Dr. Richard P. Feynman, well-known physics professor, offered the first concept in 1959.

Nanotechnology was born with the invention of the scanning tunnelling microscope in 1981 and the discovery of fullerene (C₆₀) in 1985.

Norio Taniguchi created the phrase "nanotechnology" in 1974. ^[4]

History of Nanotechnology ^[4]

Sulfide nanocrystals were used to colour hair by the Greeks and Romans 2000 years ago.

1000 Years Ago (middle Ages) - Gold nanoparticles of various sizes were employed to create varied hues in stained glass windows.

1959 - R. Feynman is a famous physicist

1974 - "Nanotechnology" Norio Taniguchi uses the term nanotechnology for the first time

1981 - IBM develops Scanning Tunneling Microscope

1985 "Buckyball" - Scientists at Rice University and University of Sussex discover Co

1986 - "Engines of Creation" - First book on nanotechnology by K. Eric Drexler. Atomic Force Microscope invented by Binnig, Quate and Gerbe

1989 - IBM logo made with individual atoms

1991 - Carbon nanotube discovered by S. Iijima

1999 - "Nanomedicine" - 1st nanomedicine book by R. Freitas

PROPERTIES

- 1) Nanotechnology is already making today's products
- 2) Lighter
- 3) Stronger
- 4) Faster
- 5) Smaller
- 6) More Durable

Approaches in nanotechnology

1. Bottom up:

Different materials and devices are built from their own molecular components in the bottom up approach. They construct themselves chemically by identifying molecules from their own breed. Watson-Crick base pairing and nano-lithography are examples of molecular self assembly.

2. Top down:

In top down approach nano objects and materials are created by larger entities without bouncing its atomic reactions usually top down approach is practiced less as compared to the bottom up approach. Solid-state techniques can also be used to create devices known as nano electromechanical systems or NEMS, which are related to micro electromechanical systems or MEMS. MEMS became practical once they could be fabricated using modified semiconductor device fabrication technologies, normally used to make electronics. ^[4]

Materials used

Zinc oxide: Dirt repellent, hydrophobic, cosmetics & stain resistant

Silver ion: Healing property

Aluminum silicate: Scratch resistance

Gold ion: Chip fabrication, drug delivery ^[4]

Advantages and Disadvantages of Nanotechnology ^[5]

Advantages of nanotechnology	Disadvantages of nanotechnology
• Enhancement of solubility and bioavailability • Protection from toxicity • Enhancement of pharmacological activity • Enhancement of stability • Improve tissue macrophage distribution • Sustained delivery • Protection from chemical (e.g., pH). physical and biological (e.g., enzymes) degradation • Enhancement of permeability (e.g., through blood brain barrier) and retention effect • Decrease side-effects of conventional drugs • Improves therapeutic effect.	• High-cost • Difficulty in scale-up processes • Easy inhalability of nanoparticles resulting into lung diseases • High immunogenicity • Chances of poor targeting • High ability to aggregate in biological systems

Applications of ZnO:

- 1) For material science applications, zinc oxide has high refractive index, high thermal conductivity, binding, antibacterial and UV-protection properties.
- 2) It is added into materials and products including plastics, ceramics, glass, cement, rubber, lubricants, paints, ointments, adhesive, sealants, concrete manufacturing, pigments, foods, batteries, ferrites, fire retardants, etc.
- 3) Numerous applications involve the dispersions of zinc oxide in a suitable solvent to get the slurry for further use in the respective industry.

Objectives:

- 1) The raw zinc oxide is hydrophobic in nature and comes in micron size.
- 2) The pharmaceutical and cosmetic industry requires the nano sized dispersions of, zinc oxide for sunscreens and to be use in nappy rash cream.
- 3) It's application of nano dispersion of zinc oxide is as pesticide for mangoes and pomegranate plants.
- 4) The top down approach for reducing the size of zinc oxide to get nano sized dispersions with the help of ball mill for pharmaceutical and agrochemical industry was explored in this research project.

LITERATURE REVIEW

Literature review on zinc oxide Nanoparticles used in sunscreen

1) Osmond . M.J. et al (2010) ^[6]

Absorption through the skin There have been no research that we are aware of that look into the hazard potential or fate of ZnO nanoparticle dust that may settle on exposed skin from the air or direct contact with other surfaces. There are few studies that have looked into nanoparticles suspended in emulsions or sunscreen formulations , however these will be discussed in the section on product use.

2) Popov et al. (2005) ^[7]

Making sunscreens more aesthetically pleasant by making them seem transparent on the skin. Nanosized metal oxide particles, in addition to easing consumer acceptance, may also provide better UV protection than their micro-sized counterparts, at least in the UV B zone.

3) Wolf et al. (2001) ^[8]

These particles reflect and scatter light in the standard pigment size ranges (150–300 nm for TiO₂ and 200–400 nm for ZnO), making the sunscreens seem white. However, as particle sizes shrink to sub-micron (nano) dimensions (usually between 20 and 150 nm for TiO₂ and 40–100 nm for ZnO), UV radiation is absorbed and scattered, and visible wavelengths are largely absorbed.

4) Mitchnick et al. (1999); Pinnell et al.(2000) ^[9,10]

As an active physical constituent in sunscreens, zinc oxide has remarkable characteristics. It absorbs UV more effectively than TiO₂ over a wider range of wavelengths, especially in the UVA area, and is hence utilised as the only active ingredient in some broad-spectrum sunscreens. The utilisation of ZnO nanoparticles slated for use in current sunscreens is the subject of this review.

5) Pinnell et al.(2000) ^[10]

When assessing the potential dangers connected with their use, keep in mind that ZnO nanoparticles provide the broadest UV protection of all the active components now available in commercial sunscreens. Their use in sunscreens provides comprehensive protection against UVA and UVB's recognised carcinogenic, immunosuppressive, and photo-aging effects.

6) Cayrol et al.(1999) ^[11]

Metal oxide particles with intrinsic UV absorption capabilities, such as zinc oxide (ZnO) and titanium dioxide (TiO₂), are commonly used as active 'physical' components. Physical UV blockers in sunscreens have been demonstrated to be quite effective in shielding cells from UV-induced DNA damage.

Literature review on zinc oxide Nanoparticles used in Covid -19 ^[19]

1) Hamza, R.Z. et al (2021) ^[12]

Coronaviruses (CoVs) are RNA viruses that are classified as such. CoVs infect mammals and birds' upper respiratory tracts first. In humans, cough and fever are the most common signs of CoV infection, and SARS-CoV-2 can also cause breathing difficulties. Severe respiratory illnesses induced by SARS-CoV-2 are among COVID-19's clinical manifestations, such as excessive inflammation and oxidation. SARS-

CoV-2 is spreading widely in humans, and COVID-19 differs from other varieties of COVID virus (CoVs) in its effects. COVID-19 is considered a pandemic, with millions of patients infected in a single year all over the world. Emerging diseases caused by corona viruses have been a major source of concern around the world.

2) Zhou, P. et al. (2020) ^[13]

Zinc has antiviral properties and may improve lymphocyte response to gene transcription or bio-molar function. Zinc oxide has a large band gap and belongs to the II-IV semi-conductor group, with binding energies of 3.2 eV and 60 meV, respectively. Zinc oxide nanoparticles have antibacterial, anti-cancer, and wound-healing characteristics, as well as the ability to block UV radiation.

3) Tsuneo, I. et al (2019) ^[14]

SARS-CoV-2 viruses are currently spherical in form, with a diameter ranging from 70 to 140 nanometers. Spikes cover the surfaces of SARS-CoV-2. SARS-CoV-2 is spread by infected people through exhalation or aerosol particles, which stick to surfaces and are then contacted by the receiver. Zinc is one of the most prevalent trace metals in the human body, with about 2–3 g in bone and muscle, 90 percent in other organs, and 10% in other tissues. Zinc is extremely important in the cells. Zn has a modest cytotoxicity and affects a number of cellular death regulators.

4) Ghaffari et al. (2019) ^[15]

Discovered that Zn^{2+} ions prevented viral reproduction and increased the intracellular Zn^{2+} content, which can effectively impede the replication of a range of RNA viruses. The goal of this study is to assess the antiviral activity of synthesised ZnO-NPs against SARS-CoV-2 infection using chemical characterization of ZNO nanoparticles, as well as to assess its use as a nano-spray against SARS-CoV-2 infection, as well as to estimate cytotoxicity and suggest future studies to improve the antiviral activity of ZnO-NPs.

5) Farouk, F. et al (2018) ^[16]

The process by which an infection develops to viral disorders, including viral entrance and shedding of diseases like COVID-19, is known as viral pathogenesis.

6) Tavakoli, A. et al (2018) ^[17]

Zinc's antiviral characteristics may make it useful in the fight against SARSCoV-2. Zinc supplementation has been recommended as a way to improve the efficacy of other medications now being studied, such as hydroxychloroquine. ZnO-NPs lowered virus titer and suppressed virus replication by 92 %.

7) Sunada, K .et al (2012) ^[18]

Zn has antiviral properties and could be used to treat a variety of respiratory viruses, including SARS-CoV-2. As a result, incorporating vitamins and minerals in one's diet can be utilized in conjunction with antiviral medications to treat COVID-19 disease.

MATERIALS & METHODS:

Materials:

Zinc oxide powder (size $\approx 0.6\text{--}1\ \mu\text{m}$, purity 99.9%, Loba, Chemi, Pvt. Ltd, India), Light Shea Butter, Cyclomethicone, Dimethicone Copolyol, Silicone elastomer gel, Cyclopentasiloxane, SS Beads (diameter 15 mm, weight 32 gm) etc.

Methodology:

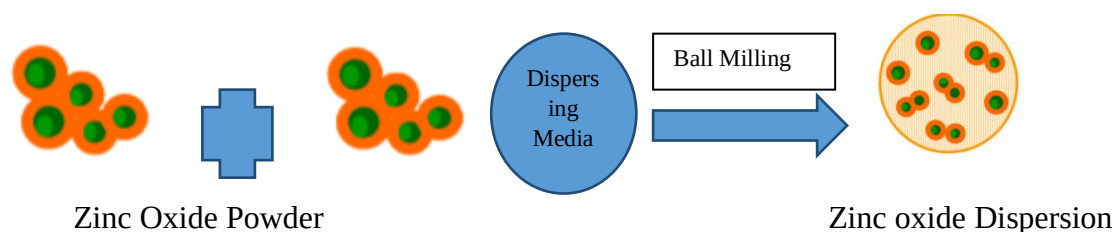


Figure No 2 : Nanoparticles of zno dispersion by using Ball mill

The mechanical milling was performed in a horizontal oscillatory mill (Remi Lab Mumbai). The mixture ratio of steel balls and ZnO powders was around 15:1 by weight percent. The milled materials were used directly with no added milling media. Five balls were kept in each cell along with 10 g of the sample powder. Two parallel cells were used in this experiment (the total weight for the sample powder was 20 g) [1-3]

Formula:

Batch No	Dispersion Media	Milling Time	Particle Size in nm
Zn Dis 01	Cyclopentasiloxane	24 Hours $\pm$ 30 Min	178 $\pm$ 10
Zn Dis 03	Cyclopentasiloxane	26 Hours $\pm$ 30 Min	124 $\pm$ 8
Zn Dis 03	Cyclopentasiloxane	28 Hours $\pm$ 30 Min	116 $\pm$ 8
Zn Dis 04	Dimethicone Copolyol	26 Hours $\pm$ 30 Min	154 $\pm$ 5
Zn Dis 05	Cyclomethicone	26 Hours $\pm$ 30 Min	179 $\pm$ 10

ZINC OXIDE NANOPARTICLES IN SUNSCREEN

Nanoparticles are one-twentieth the thickness of a human hair.

Nanoparticles are smaller than 100 nanometres and invisible to the human eye - a nanometre is 0.000001 millimetre.

Microfine particles are smaller than those used in conventional white zinc sunscreens, however are larger than nanoparticles - usually in the range of 100 to 2500 nanometres.^[4]

WHAT ARE SUN RAYS

The sun emits several kinds of electromagnetic radiation: Visible (Vis), Infrared (IR) and Ultra Violet (UV).

Each kind is distinguished by a characteristic wavelength, frequency and energy

Higher energy radiation can damage our skin^[4]

Types of UV regions	
Name+ Abbreviation	Wavelength
Ultraviolet A / UVA	400-315 nm
Ultraviolet B / UVB	315-280 nm
Ultraviolet C / UVC	280-100 nm
UVC	• The shortest wavelength • Absorbed by the atmospheric ozone
UVB	• Has largest effect on the top layer of skin • Causes redness/ burning/ skin cancer
UVA	• The longest wavelength • Reaches deep into the layers of skin, causing aging/ wrinkling

Figure No 3. Types of Sunrays

USE OF SUN-SCREEN

Too much unprotected sun exposure leads to:

Premature skin aging (e.g. wrinkles)

Sunburns

Skin cancer

NANOMATERIALS IN SUNSCREEN

sunscreens made with zinc oxide and titanium dioxide generally score well because they provide strong sun protection with few health concerns, They don't break down in the sun.

NANOMATERIALS

Titanium dioxide (TiO_2) and zinc oxide (ZnO) pigments are commonly used in personal care products to provide protection against UVA and UVB.

They attenuate UV light by absorption and scattering.

They are usually surface coated to minimize photo-catalytic activity.

They are typically produced as finer crystals from the same feed stocks and with similar processes as pigmentary grades.

zinc oxide offers good protection from UVA rays-titanium oxide less so, but better than most other active ingredients.

As the field of nanotechnology develops, nanoparticles appear more frequently in consumer products. In sunscreen, zinc oxide (ZnO) and titanium dioxide (TiO_2) nanoparticles are used to scatter ultraviolet light. The advantage of these over larger particles is that sunscreen containing nanoparticles is transparent when applied. However, the potential health risks of exposure to nanoparticles are largely unknown.

Sunscreens with nanosized ZnO particles

Sunscreens with large ZnO particles



Figure No 4 :Comparison of ZnO nanosized and large particles

Applications of zinc oxide Nanoparticles used in Covid 19

Nanoparticles have significant therapeutic potential since they are effective at low concentrations and may have powerful antiviral action against drug-resistant viruses. Nanoparticles have other essential properties, such as their adaptability for various coating types.

According to SI (IC₅₀/CC₅₀ 1), ZnO-NPs had anti-SARS-CoV-2 action with low cytotoxicity in the current investigation. These findings are in line with those of [21], who discovered that when ZnO-NPs are combined with PE-Glyated-NPs, they had higher antiviral activity but lower cytotoxicity than ZnO-NPs alone and This provides a new direction for the current investigation, which is to propose ZnO-NPs as a low-cytotoxicity disinfectant against SARS-CoV-2. We recommend employing ZnO-NPs coated with PEGlyated (Polyethylene Glylated), which enhances and elevates antiviral activity against the SARS-CoV-2 virus and may lower ZnO-NPs' cytotoxicity to host cells.

More evidence for our findings and our recommendation for coating ZnO-NPs may be found in a previous work by Ghaffari et al. [15], who discovered that ZnO-NPs have stronger cytotoxicity on breast cells than PEGlyated ZnO-NPs. ZnO-NPs create Zn²⁺ ions as well as several forms of reactive oxygen, according to our theory (ROS) and These free radicals can harm proteins, lipids, carbohydrates, and DNA, leading to cell death [16]. As a result, we believe that covering ZnO-NPs with polyethylene glycol can result in significant anti-COVID-19 action, reducing cytotoxicity and preventing reactive oxygen release by masking ZnO-NPs.

Metal nanoparticles like ZnO-NPs have recently been proven to be effective against a variety of diseases, including viruses [15]. ZnO-NPs have been shown to exhibit antimicrobial properties against a variety of human diseases [22]. The majority of investigations on ZnO-NPs, however, have focused on their inhibitory effects on bacterial infections. There are also few investigations on the interaction of ZnO-NPs with viruses. In a recent study, our lab discovered that ZnO-NPs have potent inhibitory effects on SARS-CoV-2, one of the most dangerous viruses affecting human health.

ZnO-NPs are thought to have antiviral activity due to their capacity to neutralise viruses ^[22]. Another reason for ZnO-NPs' antiviral activity is that they may stimulate and improve the immune system's defences against viruses, resulting in significant therapeutic benefits ^[23]. This strategy is critical in the fight against COVID-19.

The findings of this work confirm those of ^[24], who revealed that a negatively charged ZnO-NP can simply trap the herpes virus and prevent it from attaching to host cells.

In contrast to the current findings, Sunada et al. ^[18] discovered that culturing ZnO with viruses increased cellular survival by more than 50%, whereas cellular survival decreased in the current findings, which opens the door for more research into different concentrations of ZnO-NPs to find an effective ratio against SARS-CoV-2 with low cytotoxicity.

Such data, which confirms the anti-COVID-19 activity of ZnO-NPs at very low cytotoxicity and at very low concentration (526 ng/mL), is somewhat surprising, with somewhat low cytotoxicity that can be alleviated by coating ZNO-NPs with polymeric compounds such as PEGlyated, which may decrease the particles' diameter and We believe these findings are promising in the fight against the COVID-19 pandemic because they limit the triggering adverse effects of ROS on cellular components while attaining high infective action against SARS-CoV-2 at a very low concentration.

Anti-Viral Activity and Cytotoxicity of Zinc Oxide Nanoparticles and Inhibition Activity against SARS-CoV2 ^[19]

ZnO-NPs showed potent antiviral activity against SARS-CoV-2 in very low concentration of 526 ng/mL. The MTT assay was used to evaluate potential cell cytotoxicity of ZnO-NPs. The results showed that 292.2 ng/mL of ZnO-NPs significantly reduced the viability of VERO-E6 cells (Figure 9) and Images of Vero-6 cell after incubation with SARS-CoV-2 (after infection) which showed potent anti-viral activity of ZnO-NPs against SARS-Cov-2, the sheet of cells treated with ZnO-NPs showing enlarged patches around SRAS-CoV-2 cells as shown in (Figure)

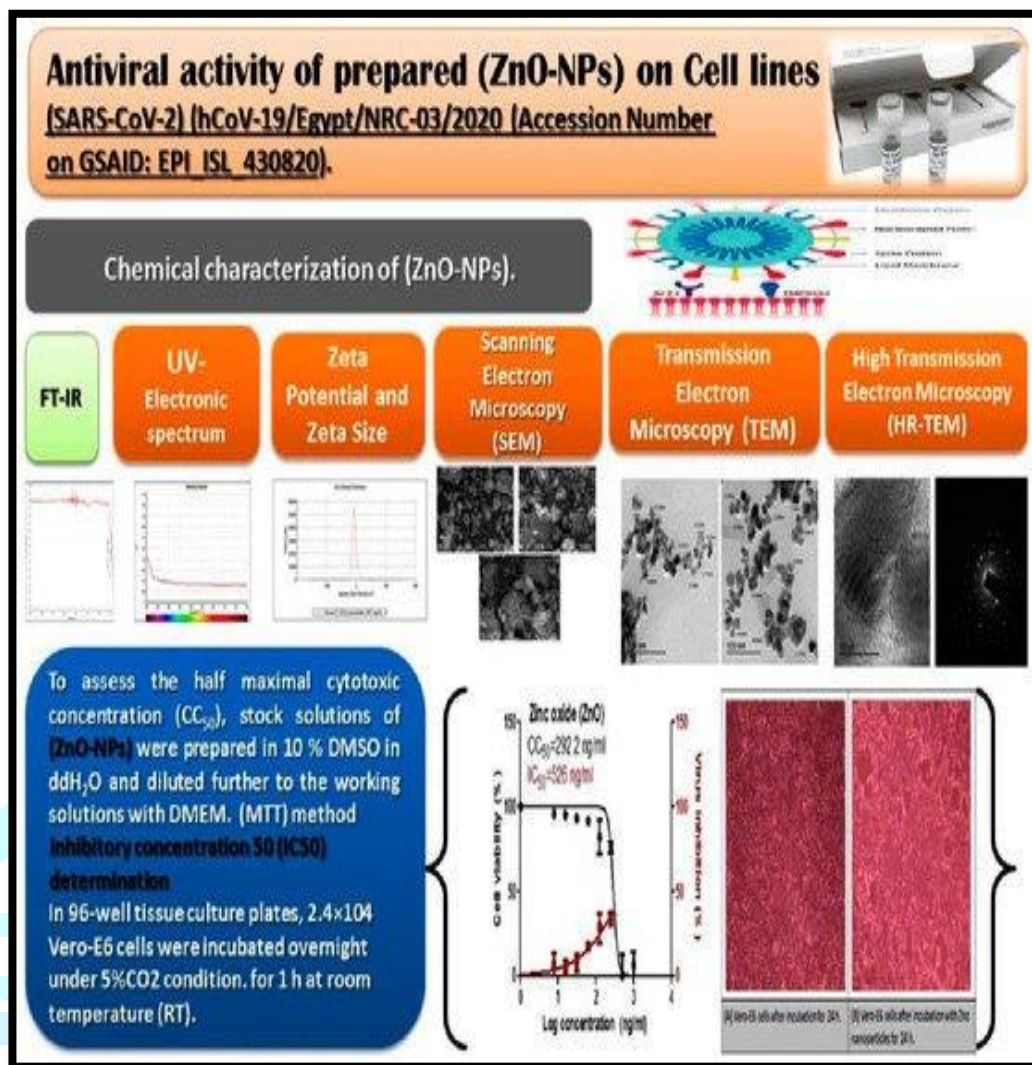


Figure No 5. Graphical abstract for the experimental work.

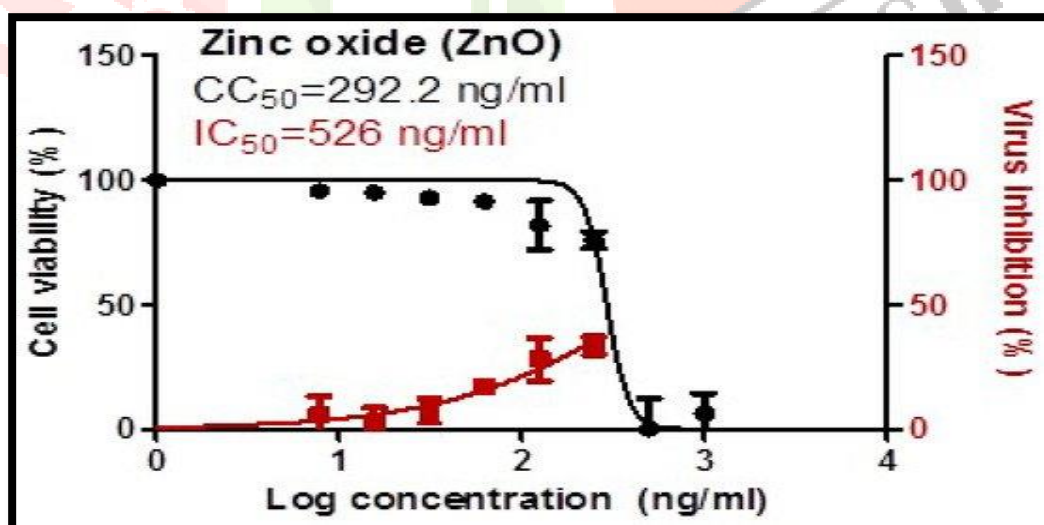


Figure No 10. Cytotoxicity and inhibitory concentration of ZnO-NPs against SARS-CoV-2

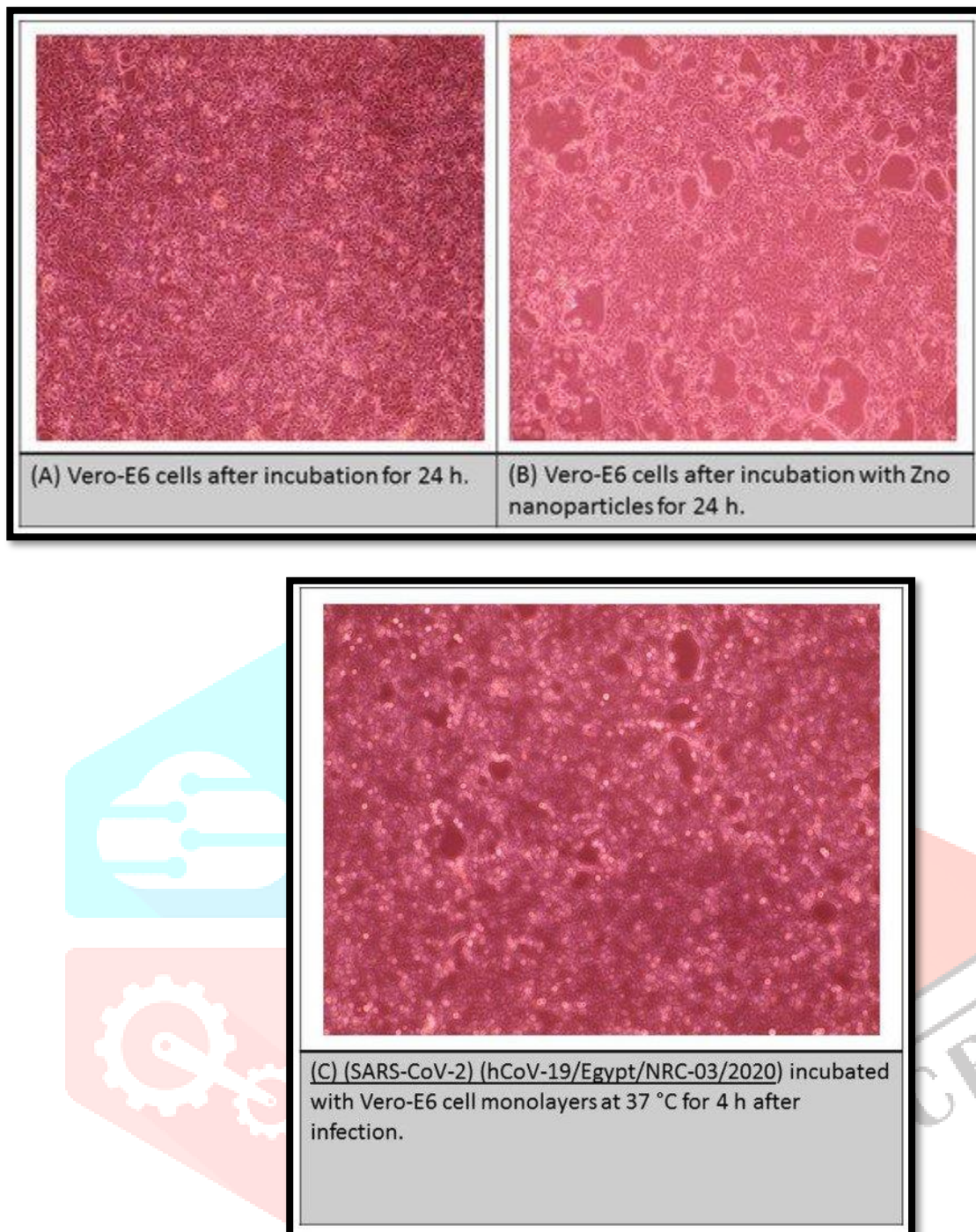


Figure No 6. Images of Vero-6 cell after incubation with SARS-CoV-2 (after infection) which showed potent anti-viral activity of ZnO-NPs against SARS-Cov-2, the sheet of cells treated with ZnO-NPs showing enlarged patches around SRAS-CoV-2 cells, thus demonstrating the ability of ZnO-NPs to disinfect SARS-CoV-2 and offer a high level of inhibition to its growth.

Evaluation of zno nps:

Physical Properties of the dispersions:

Sr. No	Parameters	Result
1	Appearance and color	White colored dispersion slurry
2	Viscosity (by Brookfield Viscometer)	7500- 12000 mPa.S
3	Assay of Zinc oxide (by Gravimetric Titration)	More than 98%

Microscopic Studies:

The developed dispersions were studied for agglomerates and also for consistency of the slurry by using electronic microscope and images were captured.



Figure No 7. Microscopic pictures of ZnO Dispersions under X 450 and X 1500 scan

2. Water & Oil Proofness Study:

Method: Applied dispersion on PET film by applicator (0.1mm). After drying, put droplet of water (blue) and squalane (red).

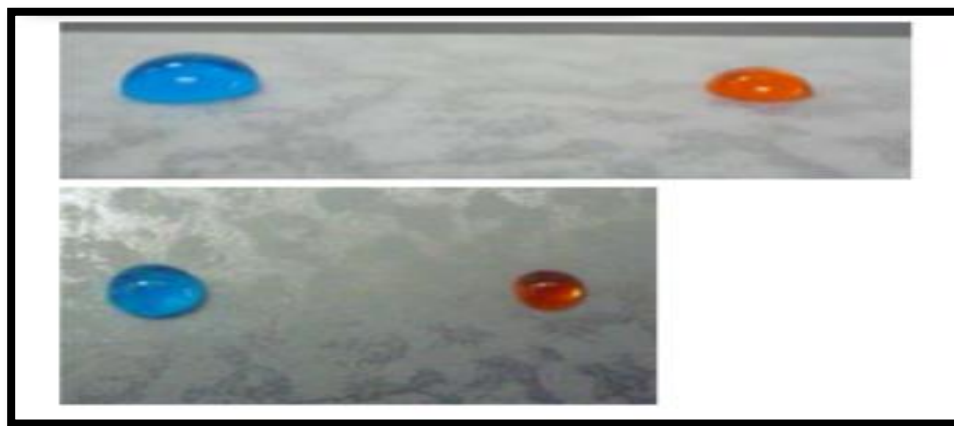


Figure No 8. ZnO Dispersion- Water and Oil Proofness Study

3. Whitish Color Change:

a) No Whitish Color Change (In Vitro) Method:

Applied Sun Screen on PET film by applicator (0.1mm). After drying, put into water for 3 minutes. Take out the film and checked the appearance.

Sunscreen with Conventional ZnO Slurry

Sunscreen with silicone ZnO Slurry





Figure No 9. Comparison of ZnO Slurry on PET film

b) No Whitish Color Change (In Vivo) Method:

Applied Sun Screen gel on human skin ($0.04\text{g}/20\text{cm}^2$), dried for 30 minutes, and put in water for 3 minutes. Took out the arm and check the appearance.



a) Sunscreen with Conventional Zinc Oxide Slurry



b) Sunscreen with silicone Zinc Oxide Slurry

Figure No 10. Comparison ZnO Applied on Human Skin

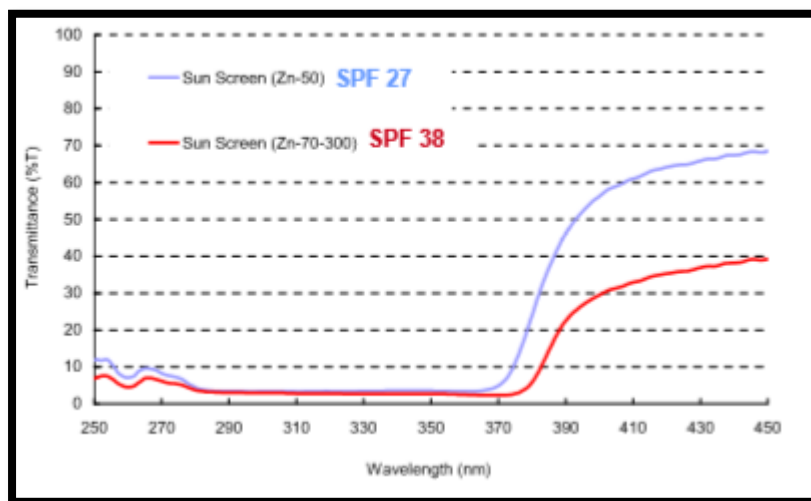


Figure No 11: SPF Determination by UV Method

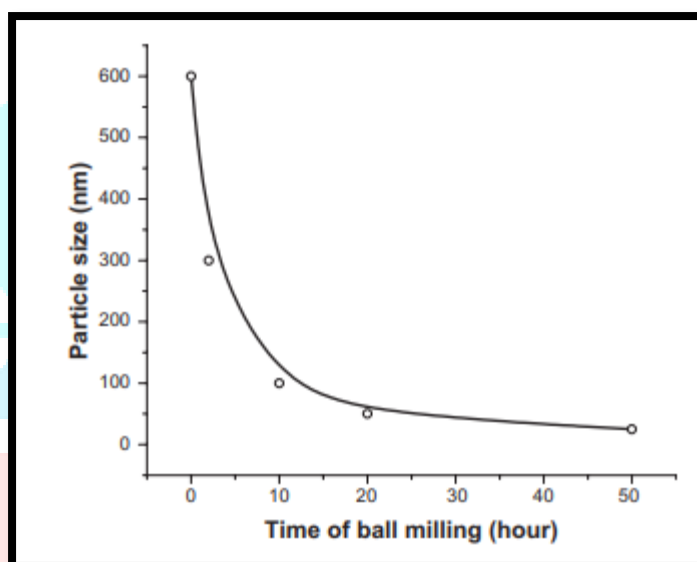


Figure No 12. Effect of milling time on Reduction of Particle size of ZnO

CONCLUSION :

These particles reflect and scatter light in the standard pigment size ranges (150–300 nm for TiO₂ and 200–400 nm for ZnO), making the sunscreens seem white. However, as particle sizes shrink to sub-micron (nano) dimensions (usually between 20 and 150 nm for TiO₂ and 40–100 nm for ZnO), UV radiation is absorbed and scattered, and visible wavelengths are largely absorbed. Making sunscreens more aesthetically pleasant by making them seem transparent on the skin. Nanosized metal oxide particles, in addition to facilitating consumer acceptance, may also provide better UV protection than their micro-sized counterparts, at least in the UVB region.

On the basis of available evidence, it is concluded that the use of ZnO nanoparticles with the characteristics listed below as a UV-filter in sunscreens at a concentration of up to 25% does not pose a risk of adverse effects in people after dermal application.

ZnO-NPs have antiviral activity against SARS-CoV-2 at very low concentrations (IC₅₀ = 526 ng/mL) and can produce oxidative stress and severe damage to SARS-CoV-2 cellular membranes, which is an

important result in the fight against SARS-CoV-2. However, we discovered that ZnO-NPs are cytotoxic to VERO-E6 cells (CC50 = 292.2ng/mL), and we urge that further prospective research be conducted using ZnO-NPs immobilisation with natural active chemicals to reduce cytotoxicity and increase antiviral efficacy against SARS-CoV-2.

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INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

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HANDWRITTEN DIGIT RECOGNITION USING PYTHON

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Abstract: Handwritten digit recognition is the intelligence of computers to recognize digits written by humans. But it becomes one of the most challenging tasks for machines as handwritten digits are not perfect and can be made with many different: flavors, size, thickness. Thus, as a solution to this problem, Handwriting digit recognition model comes into picture. Many machine learning techniques have been employed to solve the handwritten digit recognition problem. This paper focuses on Neural Network (NN) approaches. Among the three famous NN approaches: deep neural network (DNN), deep belief network (DBN) and convolutional neural network (CNN), the specialization of CNN as compared to other NN of being able to detect pattern is what makes it so useful for recognizing handwritten digits in this paper. Our goal is to implement a CNN based handwritten digit recognition model that uses the image of a digit and recognizes the digit present in the image. The performance is tested on MNIST dataset. The network was trained on 60,000 and tested on 10,000 numeral samples. We carried out extensive experiments and achieved a recognition accuracy of 99.87%.

Index Terms - Handwritten digit recognition, Machine learning, Deep Learning, Convolutional neural network, digit recognition, classification

1. INTRODUCTION

Humans can very easily see, read & write any handwritten digits, when written in proper format. Even if the digits are not written in proper format we can use our logic and predict what digit it could be. But It is a hard task for the machine to recognize handwritten digits as these are not perfect and can be made with many different flavors. Thus handwritten digit recognition is the solution to this problem which uses the image of a digit and recognizes the digit present in the image. The handwritten digit recognition is the ability of computers to recognize human handwritten digits. Since the 1980s handwriting recognition of digits has been around. Research in this area has been a standard area because of its usage in technologies such as postal mail sorting, bank check processing, form data entry, etc. Even though any digital image is a matrix of 0's and 1's, the computer comes to know whether the input image is a digit by recognizing some specific formats. Thus a handwritten digit recognition model helps in recognizing such patterns which in turn recognizes the digits. Our goal is to build a model that can efficiently and reliably recognize the digits and output the proper result. Amongst all the other neural networks, working and implementing a model using Convolution Neural Network gives out the most precise results. It is most popularly used for analyzing images as well as for other data analysis or classification problems. CNN has hidden layers called convolutional layers. These layers work the same way as other layers do but here we need to specify the no of filters each layer should have. These filters are actually what detects the pattern. Patterns could be edges, corners, circles or any complex other objects like eyes, ears or even deeper full dogs, cats, etc. Thus, the specialization of CNN as compared to other NN of being able to detect patterns is what makes it so useful for recognizing handwritten digits.

2. LITERATURE REVIEW

In the paper, "Handwritten Digit Recognition Using Deep Learning" the authors, "Anuj Dutt, Aashi Dutt" have compared the results of some of the most widely used Machine Learning Algorithms like KNN & RFC and with Deep Learning algorithm like multilayer CNN using Keras with Theano and Tensorflow. Using these, they were able to get the accuracy of 98.70% using CNN (Keras+Theano) as compared to 97.91% using SVM, 96.67% using KNN, 96.89% using RFC [1].

The authors of the paper, "Handwritten Digit Recognition: Applications of Neural Network Chips and Automatic Learning", had applied neural network methods to a large, real-world task. Our results appear to be the state of the art in digit recognition. We demonstrated that a general-purpose neural network chip can be incorporated as an accelerator in a large network. They found that real problems with regularity scale well. They also showed that a network can be trained on a low-level representation of data that has minimal preprocessing [2].

In the paper, "Unconstrained Handwritten Numeral Recognition Using Majority Voting Classifier" the authors, "Rajiv Kumar, Pervez Ahmed, Mayank Kumar Goyal, Amresh Kumar" presented a simple profile, combined local & global features and majority voting scheme classifier for unconstrained handwritten numeral recognition. Linear discriminant analysis and KNN classifiers are used for classifying these features. A majority voting scheme has been performed with three neural network

classifiers and KNN classifiers. The performance is tested on MNIST dataset. The network was trained on 60,000 and tested on 10,000 numeral samples of which 98.05 % test samples are correctly recognized [3][4].

The authors, "Stefan Knerr, LCon Personnaz, and GCrard Dreyfus" of "Handwritten Digit Recognition by Neural Networks with Single-Layer Training" had introduced the STEPNET procedure, which decomposes the handwritten digit recognition problem into simpler subproblems that can be solved by linear separators. They presented results from two different databases: a European database comprising 8700 isolated digits, and a zip code database from the U.S. Postal Service comprising 9000 segmented digits [5].

3. METHODOLOGY

In this part we are depicting the different advances and acknowledges like general algorithm, strategies, datasets utilized, how the models are made and how the models were prepared are tried.

3.1. GENERAL ALGORITHM

The Figure 3.1 portrays the Data flow diagram of the proposed system model.

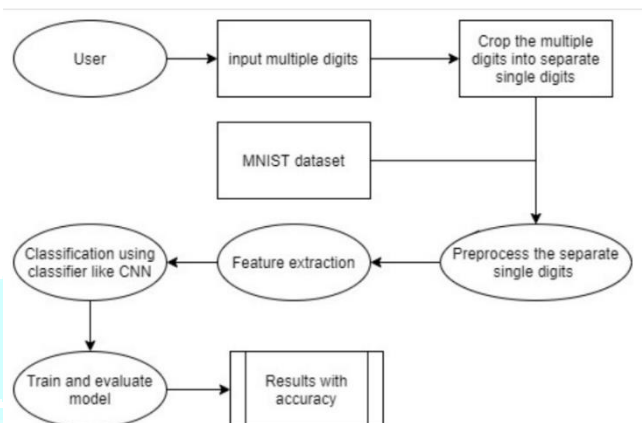


Fig. 3.1 Plotting of Some Random MNIST Handwritten Digits

The steps shown in the figure are as follows :

1. **input multiple digits** in this step, user provides the image of digits by drawing image on screen.
2. **crop the image into separate single digits** for situation draws the multiple images on screen and crop the digits into separate single digits
3. **MNIST dataset** for providing the dataset to further steps
4. **image preprocessing** which converts the color image to a monochrome one, prepared for further analysis;
5. **feature extraction** involves reducing the number of resources required to describe a large set of data
6. **classification using CNN** is the stage in which the value of the digit is computed with a completely different algorithm.
7. **train and evaluate model** The train-test split is a procedure for assessing the performance of an machine learning algorithm
8. **Results and accuracy** returns the most probable value of the digit with a confidence. We cannot rely solely on this results, therefore the next step is required;

3.2. MNIST DATASET USED

The MNIST database of handwritten digits, available from this page, has a training set of 60,000 examples, and a test set of 10,000 examples. It is a subset of a larger set available from NIST. The digits have been size-normalized and centered in a fixed-size image [6]. Modified National Institute of Standards and Technology (MNIST)[7] is a large set of computer vision dataset which is extensively used for training and testing different systems. It was created from the two special datasets of National Institute of Standards and Technology (NIST) which holds binary images of handwritten digits. The training set contains handwritten digits from 250 people, among them 50% training dataset was employees from the Census Bureau and the rest of it was from high school students [8]. However, it is often attributed as the first datasets among other datasets to prove the effectiveness of the neural networks. Figure 3.2 shows the Distribution of Each Digits for Training and Testing.

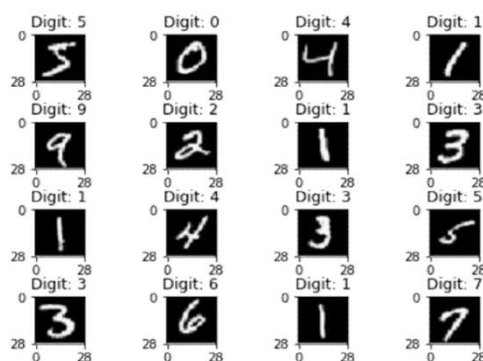


Fig. 3.2 Dataflow Diagram of General Algorithm

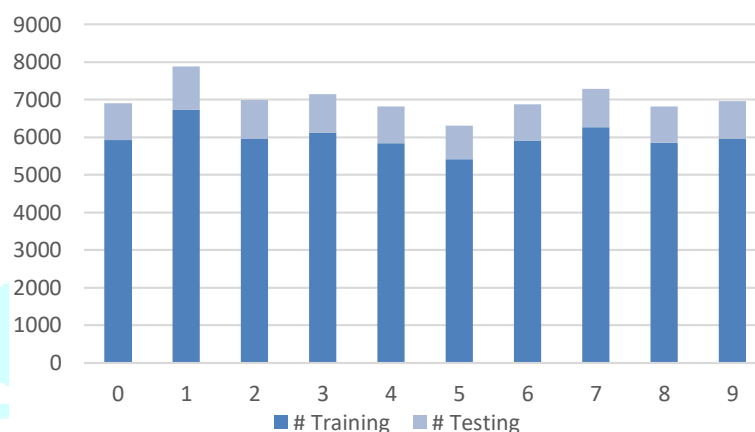


Fig. 3.3 Distribution of Each Digits for Training and Testing

The database contains 60,000 pictures utilized for preparing for cross-validation purposes and 10,000 pictures utilized for testing [9]. All the digits are gray scale and positioned in a fixed size where the intensity lies at the center of the image with 28×28 pixels. Since all the images are 28×28 pixels, it forms an array which can be flattened into $28 \times 28 = 784$ -dimensional vector. Each component of the vector is a binary value which describes the intensity of the pixel [10]. Figure 3.3 shows the some of the digits from MNIST dataset.

3.3. CONVOLUTIONAL NEURAL NETWORK

CNN is a deep learning algorithm that is widely used for image recognition and classification. It is a class of deep neural networks that require minimum pre-processing. It inputs the image in the form of small chunks rather than inputting a single pixel at a time, so the network can detect uncertain patterns (edges) in the image more efficiently. CNN contains 3 layers namely, an input layer, an output layer, and multiple hidden layers which include Convolutional layers, Pooling layers (Max and Average pooling), Fully connected layers (FC), and normalization layers [11]. CNN uses a filter (kernel) which is an array of weights to extract features from the input image. CNN employs different activation functions at each layer to add some non-linearity [12] [13].

4. IMPLEMENTATION

4.1. PROPOSED ALGORITHM

Algorithm for handwritten digit recognition generally comprise of three stages.

- **Step 1** Pre-processing. This progression should eliminate immaterial information and information that could have negative impact on acknowledgment. Common steps in this fluster are binarization, standardization, smoothing, denoising
- **Step 2** Feature extraction. Feature extraction involves reducing the number of resources required to describe a large set of data.
- **Step 3** Classification. Classification is a process related to categorization, the process in which ideas and objects are recognized, differentiated and understood.

4.2. PREPROCESSING

Pre-handling is an underlying advance in the machine and profound realizing which centers around working on the information by reducing undesirable pollutants and repetition. To rearrange and separate the information every one of the pictures present have been reformed in 2-dimensional pictures i.e. $(28, 28, 1)$. Every pixel esteem of the pictures lies between 0 to 255 followed by Normalizing these pixel esteems by changing over the dataset into 'float32' and then, at that point isolating by 255.0 so the info highlights will go between 0.0 to 1.0. Then, one-hot is performed encoding to convert the y esteems into zeros and ones, making each number straight out, for instance, a yield esteem 4 will be changed over into a variety of nothing and one i.e. $[0, 0, 0, 0, 1, 0, 0, 0, 0]$ [13]. The accuracy in recognition of handwritten numerals can be improved by preprocessing the raw data. With a brief investigation of the raw image data, the main issues discovered are image noise and unrecognizable handwriting. Thus, preprocessing of the raw

data is deemed to be necessary before training them. A series of image processing techniques are conducted to lead through the preprocessing stage.

4.3. NOISE REDUCTION

The idea of image noise reduction is to train a model with noisy data as the inputs, and their respective clear data the outputs[14]. Noise reduction is the process of removing noise from a signal. Noise reduction techniques exist for audio and images. Noise reduction algorithms may distort the signal to some degree [15].

4.4. EXPERIMENT

So now let's dive into the implementation of our project. In practical result of our software. We have designed a simple and very user-friendly UI for own software.

The Figure. 4.1a shows the front-end design of the system output. The following figures show the sequence of steps to be carried out to obtain the required output.

1. It has a menu button at the top, that given a drop-down list of "Increase Brush Size", "Decrease Brush Size", "Brush Color" options on click. Figure. 4.1b shows the functionality of software.
2. The center panel of our software consists of the area where users can actually draw their favorite digit.
3. The Figure 4.1c depicts how user draws shape of digit 2 on empty space with help of mouse pointer. Our software is locally capable of recognition digit (0-9).
4. After drawn the digit inside box, the bottom panel of on "Evaluate" button which will process the digit drawn by the user and will recognize and deploy the digit on the result and digit (0-9) of us like simple. We need to move our cursor to the center panel and drawn any digit in whichever form want and the software will undoubtedly process the input given to it and deploy the correct output in the correct form. The example is shows in Figure 4.1c.
5. User can actually draw multiple digits on screen and lift the mouse during the drawing digit and draw another digit if wants to. The Fig. 4.1d shows how digits '7', '3' are drawn on screen and output generated digits '7', '3' matching with input.
6. Fig. 4.1e shows how digits '0', '1', '8' is drawn by user and output evaluated correctly by CNN classifier. The bottom panel has an "Evaluate" button that on clicking processing the input and then shows the result. The

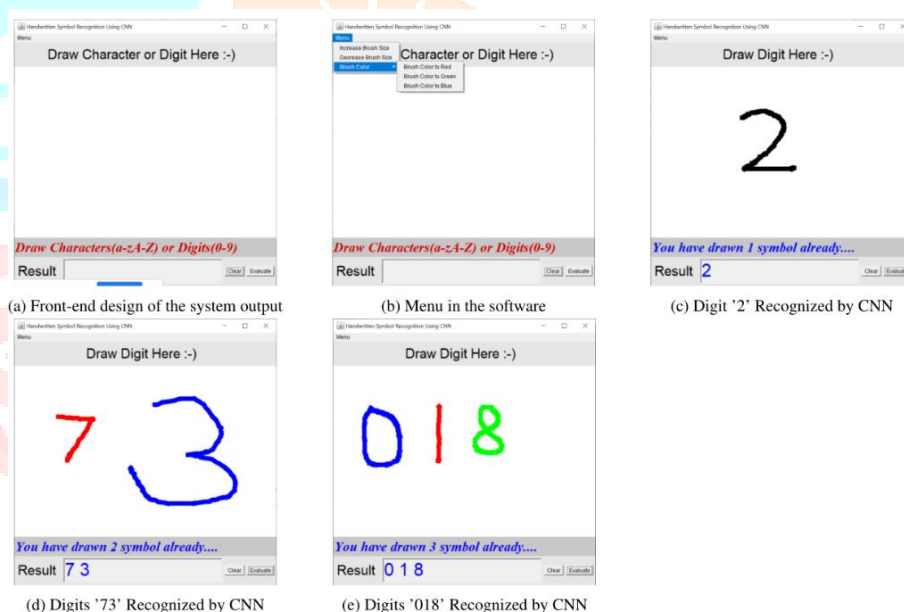


Fig. 4.1 Images of software

5. RESULTS

During the experimentation execution of sigmoid, softmax, relu and tanh activation capacities are tested. Results are taken with various enhancers specifically Adam, Adagrad, Adadelata, SGD and RMSprop. Table 5.1 shows the Performance after using different optimizers.

Table 5.1 Performance of Different optimizers

		MNIST dataset	
Optimizer	epoch	Training accuracy	Testing accuracy
SGD	50	99.64%	99.34%
RMSprop	50	99.21%	99.11%
Adagrad	50	99.97%	98.18%
	60	99.62%	98.09%
Adadelata	50	99.86%	99.27%
	70	99.47%	99.15%
	100	99.44%	99.20%
Adam	50	99.02%	98.05%
	60	98.88%	98.74%
	70	99.73%	98.01%
	80	99.07%	99.43%
	90	98.56%	99.19%

Table 5.2 shows the outcome with changing batch size. Sigmoid activation function, 0.1 dropout and Adam optimizer is utilized. Expanding batch size is not having effect on testing/training precision.

Table 5.2 Batch size experimentation

		MNIST dataset	
Batch Size		Training accuracy	Testing accuracy
16		98.40%	98.78%
32		97.13%	97.98%
100		98.36%	97.86%
120		98.11%	97.73%
140		98.83%	98.49%
150		97.54%	98.01%
160		98.73%	97.29%
200		97.83%	98.79%

Table 5.3 shows impact of adam optimizer, sigmoid activation function, 100 Batch size, 60 epochs with fluctuating learning rate. Accuracy on MNIST dataset is greater than 98%-99% for most of cases.

Table 5.3 Learning rate experimentation

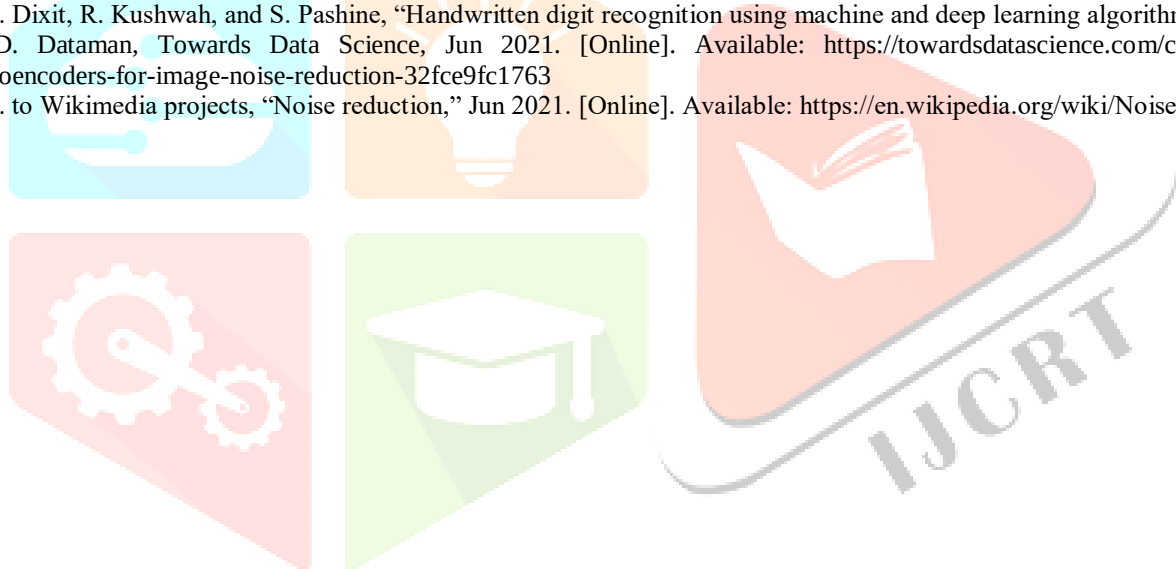
		MNIST dataset	
Learning Rate		Training accuracy	Testing accuracy
0.01		98.99%	98.84%
0.02		96.97%	96.95%
0.001		99.50%	99.29%
0.002		98.06%	96.41%

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