EMPLOYABILITY SKILLS

NSQF

1st Year (Volume II of II)

COMMON FOR ALL TRADES



DIRECTORATE GENERAL OF TRAINING MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP GOVERNMENT OF INDIA



NATIONAL INSTRUCTIONAL MEDIA INSTITUTE, CHENNAI

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Employability Skills (NSQF) - 1st Year (Volume II of II) Common for All Trades

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FOREWORD

The Government of India has set an ambitious target of imparting skills to 30 crores people, one out of every four Indians, by 2020 to help them secure jobs as part of the National Skills Development Policy. Industrial Training Institutes (ITIs) play a vital role in this process especially in terms of providing skilled manpower. Keeping this in mind, and for providing the current industry relevant skill training to Trainees, ITI syllabus has been recently updated with the help of Mentor Councils comprising various stakeholder's viz. Industries, Entrepreneurs, Academicians and representatives from ITIs.

The National Instructional Media Institute (NIMI), Chennai, has now come up with instructional material to suit the revised curriculum for **Employability Skills 1**st **Year (Volume II of II)** NSQF Common for all trades will help the trainees to get an international equivalency standard where their skill proficiency and competency will be duly recognized across the globe and this will also increase the scope of recognition of prior learning. NSQF trainees will also get the opportunities to promote life long learning and skill development. I have no doubt that with NSQF the trainers and trainees of ITIs, and all stakeholders will derive maximum benefits from these IMPs and that NIMI's effort will go a long way in improving the quality of Vocational training in the country.

The Executive Director & Staff of NIMI and members of Media Development Committee deserve appreciation for their contribution in bringing out this publication.

Jai Hind

RAJESH AGGARWAL

Director General/Addl. Secretary Ministry of Skill Development & Entrepreneurship, Government of India.

New Delhi - 110 001

PREFACE

The National Instructional Media Institute(NIMI) was set up at Chennai, by the Directorate General of Training, Ministry of skill Development and Entrepreneurship, Government of India, with the technical assistance from the Govt of the Federal Republic of Germany with the prime objective of developing and disseminating instructional Material for various trades as per prescribed syllabus and Craftsman Training Programme(CTS) under NSQF levels.

The Instructional materials are developed and produced in the form of Instructional Media Packages (IMPs), consisting of Trade Theory, Trade Practical, Test and Assignment Book, Instructor Guide, Wall charts and Transparencies. The above material will enable to achieve overall improvement in the standard of training in ITIs.

A national multi-skill programme called SKILL INDIA, was launched by the Government of India, through a Gazette Notification from the Ministry of Finance (Dept of Economic Affairs), Govt of India, dated 27th December 2013, with a view to create opportunities, space and scope for the development of talents of Indian Youth, and to develop those sectors under Skill Development.

The emphasis is to skill the Youth in such a manner to enable them to get employment and also improve Entreprenurship by providing training, support and guidance for all occupation that were of traditional types. The training programme would be in the lines of International level, so that youths of our Country can get employed within the Country or Overseas employment. The **National Skill Qualification Framework** (**NSQF**, anchored at the National Skill Development Agency(NSDA), is a Nationally Integrated Education and competency-based framework, to organize all qualifications according to a series of **levels of Knowledge**, **Skill and Aptitude**. Under NSQF the learner can acquire the Certification for Competency needed at any level through formal, non-formal or informal learning.

The **Employability Skills** (common to all Trades) is one of the book developed by the core group members (as per the NSQF) syllabus. The 1st Year (Volume II of II) book includes Module 1 - Entrepreneurship Skills, Module 2 - Productivity, Module 3 - Occupational Safety, Health and Environment Education, Module 4 - Labour Welfare Legislation, Module 5 - Quality Tools.

The **Employability Skills** (common to all Trades as per NSQF) 1st Year (Volume II of II) is the outcome of the collective efforts of experts from Field Institutes of DGT champion ITIs for each of the Sectors, and also Media Development Committee (**MDC** members and Staff of **NIMI**. NIMI wishes that the above material will fulfill to satisfy the long needs of the trainees and instructors and shall help the trainees for their Employability in Vocational Training.

NIMI would like to take this opportunity to convey sincere thanks to all the Media Development Committee (MDC) members.

Chennai - 600 032

R. P. DHINGRA EXECUTIVE DIRECTOR

ACKNOWLEDGEMENT

The National Instructional Media Institute (NIMI) sincerely acknowledge with thanks the co-operation and contribution of the following Media Developers to bring this IMP for the course **Employability Skills** 1st Year (Volume II of II) as per NSQF.

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NIMI records its appreciation of the **Data Entry, CAD, DTP Operators** for their excellent and devoted services in the process of development of this IMP.

NIMI also acknowledges with thanks, the efforts rendered by all other staff who have contributed for the development of this book.

INTRODUCTION

This Instructional Material consists of both Theory and Practical exercise for the subject "**Employability Skills**" 2nd semester (Common book for all Trades). Duration of this subject is 55 Hours, containing 5 different modules, and the time distribution for each module is given below.

	Total	55 Hours.
Module 5	Quality Tools	10 Hrs
Module 4	Labour Welfare Legislation	05 Hrs
Module 3	Occupational Safety, Health and Environment Education	15 Hrs
Module 2	Productivity	10 Hrs
Module 1	Entrepreneurship Skills	15 Hrs.

The objectives mentioned in each lesson are included in the begining of each lesson which must be covered.

This Written Instructional Material is not for the purpose of self learning and should be considered as supplementary to the class room Instructions.

GUIDELINES FOR USE

Module 1 - Entrepreneurship Skills

This module is divided into 9 theory lessons and four related exercises. It is intended for the aspiring youths who undergo technical trainings in various trades and wish to take up entrepreneurship as a career opportunity. The lessons are focused in getting the trainees informed/ motivated towards entrepreneurship, and getting a business plan written by them.

The templates given for the exercises shall be discussed first and later the trainees will be asked to answer by themselves prior to undertaking exercise on project report preparation. The trainees will be asked to go for a survey on market demands for a chosen product/service activity.

Module 2 - Productivity

In today's world, productivity reflects about creating optimum output from available resources such as raw material, labour, skills, capital equipment, land, intellectual property, managerial capability and financial capital. 'Productivity' is about how well people combine resources to produce goods and services.

This module covers the topics like Productivity & its beneifts, GDP, Comparisons of productivity with developed countries, banking processes, risk insurance etc.

Module 3 - Occupational Safety, Health and Environment Education

The goal of the occupational safety is to provide a safe work environment and to prevent hazards. It protects co-workers, family members, employees, customers, suppliers and others who are involved in the workplace environment.

It is environment education which can best help us as individuals make the complex, conceptual connections between economic prosperity, benefits to society, environmental health, and our own well being. Latest crises like global warming, Ozone depletion, Acid Rain etc. have been included to make our trainees aware about the current environment issues.

This module covers the topics like Safety & Health, Occupational Hazards, First Aid, Eco System, Pollutions, Conservation of Energy, Global Warming etc.

Module 4 - Labour Welfare Legislation

Labour welfare is an important dimension of industrial relation. Labour welfare includes overall welfare facilities designed to take care of well being of employee's and in order to increase their living standard.

The importance of labour in industrialization and economic development has been recognised globally. In global scenario, need and importance of labour welfare has been increasingly appreciated.

This module covers the topics like Factories Act, Apprenticeship Act, Payment Wages Act, Employees Provident Fund Act etc.

Module 5 - Quality Tools

The quality tools given here are very important for not only providing them precise knowledge inputs but also would be able to apply problem solving techniques through development of QC for continuous improvements to become an outstanding and efficient quality personal to bring growth to the organization and his/her personal growth.

This would certainly structure and prepare young minds to be suited for futuristic TQM organizations.

The quality tools are in modular nature and each Theory/Exercise is designed to enhance the skill sets of individuals so that they can better adapt to job challenges. They are relevant to all industry sectors and are structured for an entire organization covering all operations.

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LEARNING / ASSESSABLE OUTCOME

On completion of this book you shall be able to

- Understanding the need for self-employment and acquiring Entrepreneurship Skills, preparing project report for a venture.
- Learn about marketing principles, method, and aquainting with Institutions offering various services for industrial venture.
- Learn on project formation, legal formalities and costing procedures.
- Understand the need for improving living standard, acquainting with finance & banking procedures.
- Learn skills & working aids to improve quality, comparitive productivity methods in developed countries, Automation, Motivation and Improvement of Living Standard.
- Learn the various Health and Safety procedures, acquainting with all types of hazards and the technique to reduce or eliminate hazards.
- Learn about Environment, Pollutants, and the need for Conservation of Energy.
- Learn about Labour Laws and various Legislative Acts, applicable for industrial venture.
- Learn the importances of Quality, acquainting with Quality Circle, problem solving tools, and the global Quality Management System.
- Learn the Importance of House-keeping.

SYLLABUS

1st Year (Volume II of II)

Duration: 55 Hours

Duration	Ref. Learning Outcome	Lesson Title	Lesson Content
		1 Entrepreneurship Skills	
15 Hours	Understanding the need for self - employment and	Concept of Entrepreneurship	Entrepreneur - Entrepreneurship - Enterprises : Conceptual issue
	skills, preparing project report for a venture.		Entrepreneurship vs Management, Entrepreneurial Motivation, Performance&Record,Role&Function of entrepreneurs in relation to the enterprise & relation to the economy, Source of business ideas, Entrepreneurial opportunities, the process of setting up a business
	Learn about marketing principles, methods and acquainting with Institutions offering various services for industrial venture.	Project Preparation & Marketing Analysis	Qualities of a good Entrepreneur, SWOT and Risk Analysis. Concept & application of PLC, Sales & distribution Management. Difference Between Small Scale & Large Scale Business, Market Survey, Method of marketing, Publicity and advertisement, Marketing Mix
	Learn on project formation, legal formalities and costing procedures.	Institutions Support	Preparation of Project. Role of Various Schemes and Institutes for self- employmenti.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non-financing support agencies to familiarizes with the Policies/Programmes & procedure & the available scheme
	Understand the need for improving living standard, acquainting with finance & banking procedure.	Investment Procurement	Project formation, Feasibility, Legal formalities i.e., Shop Act, Estimation & Costing, Investment procedure - Loan procurement - Banking Processes
		2 Productivity	
10 Hours	Learn Skills & working aids to improve quality, comparative productivity methods in developed countries, automation motivation and improvement of living standard.	Benefits	Personal/ Workman - Incentive, Pro- duction Linked Bonus, Improvement in living standard.
		Affecting Factors	Skills, Working Aids, Automation, Environment, Motivation - How it improves or slows down productivity

Duration	Ref. Learning Outcome	Lesson Title	Lesson Content
		Comparison with Developed Countries	Comparative productivity in developed countries (viz.Germany, Japan and Australia) in selected industries e.g. Manufacturing, Steel, Mining, Construction etc. Living standards of those countries, wages
		Personal Finance Manage- ment	Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance
		3 Occupational Safety, Health and Environment Education	
15 Hours	Learn the various Health and Safety procedures, acquaint- ing with all types of hazards and the technique to reduce or elimiate hazards.	Safety & Health	Introduction to Occupational Safety and Health, importance of safety and health at work place.
	Learn about Environment, Pollutants, and the need for Conservation of Energy.	Occupational Hazards	Basic Hazards, Chemical Hazards, Vibroacoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygiene, Occupational Diseases/Disorders & its prevention
		Accident & Safety	Basic principles for protective equipment
			Accident Prevention Techniques - control of accidents and safety measures
		First Aid	Care of injured & Sick at the work- places, FirstAid & Transportation of sick person
		Basic Provisions	Idea of basic provision legislation of India
			Safety, health, welfare under legislation of India
		Eco system	Introduction to Environment. Relationship between Society and Environment, Ecosystem and Factors causing imbalance
		Pollution	Pollution and pollutants including liquid, gaseous, solid and hazardous waste
		Energy Conservation	Conservation of Energy, re-use and recycle

Duration	Ref. Learning Outcome	Lesson Title	Lesson Content
		Global warming	Global warming, climate change and Ozone layer depletion
		Ground Water	Hydrological cycle, ground and surface water, Conservation and Harvesting of water
		Environment	Right attitude towards environment, Maintenanceofin-houseenvironment
		4 Labour Welfare Legislation	
5 Hours	Learn about Labour laws and various Legislative Acts, applicable for Industrial venture.	Welfare Acts	Benefits guaranteed under various acts-Factories Act, Apprentice- ship Act, Employees State Insurance Act (ESI), Payment Wages Act, Em- ployees Provident Fund Act, The Workmen's Compensation Act
		5 Quality tools	
10 Hours	Learn the importance of Qual- ity, acquainting with Quality Circle, problem solving tools and the global Quality Man- agement System.	Quality Consciousness	Meaning of quality, Quality characteris- tic
	Learn the importance of House-keeping	Quality Circles	Definition, Advantage of small group ac- tivity, objectives of quality Circle, Roles and function of Quality Circles in Organi- zation, Operation of Quality circle. Ap- proaches to starting Quality Circles, Steps for continuation Quality Circles.
		Quality Management System	Idea of ISO-9000 and BIS systems and its importance in maintaining qualities
		House Keeping	Purpose of House-keeping, Practice of good Housekeeping.
		Quality Tools	Basic quality tools with a few examples

MODULE 1 ENTREPRENEURSHIP SKILLS

Theory 2.1.27

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Entrepreneur and Entrepreneurship, role and functions of Entrepreneur

Objectives: At the end of this lesson you shall be able to

- define entrepreneur, entrepreneurship and enterprise
- state the advantages of entrepreneurship
- state the role and function of entrepreneur
- list out the qualities of good entrepreneur
- state entrepreneur vs Management (or) Manager.

The word **'entrepreneur'** brings to our mind the images of very famous business tycoons like Tata, Birla and Ambani. How they are different from others? The only answer is their entrepreneurship skills.

It is not that only big business person requires entrepreneurship skill. Even to start our own small business, we do require entrepreneurship skill to make the business successful and achieve financial gain.

The Concept of Entrepreneurship



Entrepreneur

"An entrepreneur is a person who takes risk of setting up his own business venture for perceived rewards. He is a person who initiates the idea, formulates a plan, organise resources and puts the plan into action to achieve his/ her goal".

Entrepreneurship

Entrepreneurship is the process of planning, organizing, operating, and assuming the risk of a business venture. Entrepreneurship is a process involving various actions to be undertaken to establish an enterprise. Innovation and risk bearing is regarded as the two basic elements involved in entrepreneurship. Individuals performing these functions are the entrepreneurs and their enterprising ability and skill is known as 'entrepreneurship'.

Enterprise

An enterprise is the business organization that is formed, which provides goods and services, creates jobs, contributes to national income, exports and overall economic development.

Need of Self Employment

The main need for Self Employment in any country is for economic development. Economic growth depends on the rate of innovation in the economic field, which in turn depends on the number and quality of entrepreneurs in the society. Thus, self employment is an agent of progress in the society.

Self Employment is needed for:

- economic growth
- new ideas, imagination and vision to the enterprise.
- solutions to meet the challenge of changing environment and technology.
- opportunities for future growth and development by reducing costs, increases its profits.
- maximising employment opportunities.
- Good living standard through good quality products and services at the lowest possible cost

Advantages of Entrepreneurship/Self Employment

Every successful entrepreneur brings about benefits not only for himself/ herself but for the region or country as a whole. The benefits that can be derived from entrepreneurial activities are as follows:

- · Enormous personal financial gain
- · More job satisfaction and flexibility
- Development of more industries, especially in rural areas or regions; Income generation and increased economic growth
- Encouragement of the processing of local materials into finished goods for domestic consumption as well as for export
- Freedom from the dependency on the jobs offered by others and to give employment for others
- Entrepreneurship is motivated by the drive to meet personal, emotional or financial needs of the individual.

Function of entrepreneur

The various functions performed by entrepreneur are:

- Entrepreneur begins into the existence of a business unit and therefore he acts as a promoter.
- Entrepreneur arranges the various factors of production and finance for the business.
- Entrepreneur sets up the desired organisation and prepares plans and policies for its smooth functioning.

UNTRUPRUNUURSHIP SKILL

Entrepreneur co-ordinates the other factors of production. Co-ordination involves selection of right type of factors, employment of each factor in right quantity, use of the best technical devices, division of labour, reduction of waste etc.

- The entrepreneur takes risks. He assumes all possible risk of business which emerges due to the possibility of changes in the taste of consumers, introducing modern techniques of production and new inventions.
- The entrepreneur can undertake any type of the following categories of innovation:
 - Introduction of new good or new quality of good.
 - · Introduction of new method of production.
 - The conquest of new source of supply of raw materials.
 - The carrying out of a new organisation of any industry.
 - Exploring & exploiting available resources into a successful product.

Role of entrepreneur in economic growth

Entrepreneurship is the dynamic need of developing nation and sustains the process of economic development in the following ways:

- 1 Capital formation
- 2 Generation of employment
- 3 Improvement in per capita income
- 4 Reduces concentration of wealth
- 5 Balanced regional development
- 6 Resource mobilization
- 7 Improvement in standard of living
- 8 National self reliance

Distinction between entrepreneur and manager

Often the two terms namely entrepreneur and manager are considered as synonym. However they give different meaning. The major points of distinction between the two are :

SI. No.	Points	Entrepreneur	Manager
1	Motive	The main motive of an entrepreneur is to start a venture for his personal gratification.	Main motive of a manager is to render services in an enterprise already set up by someone else.
2	Status	Owner	Servant
3	Risk	Assumes and takes risk and uncertainty.	Manager does not bear any risk involved in the enterprise.
4	Rewards	Profits, which are highly uncertain and not fixed, but expected to reach very high level	Salary which is certain and fixed.
5	Innovation	Entrepreneur himself thinks over what and how to produce goods to meet the changing needs of the customers. Hence he acts as innovator/change agent.	A manager simply executes plan prepared by the entrepreneur.
6	Qualification	An entrepreneur needs to possess qualities and qualification like high achievement motive, originality in thinking, foresight, riskbearing ability etc.	A manager needs to possess distinct academic/professional qualifications in terms of sound knowledge in related fields & in the management theory and practice.

Qualities of a good entrepreneur

The following are the qualities of good entrepreneur:

- Initiative- acting out of choice rather than compulsion, taking the lead rather than waiting for others to start.
- Sees and Acts on Opportunities- A mindset where one is trained to look for business opportunities from everyday experiences, and takes a plunge.
- **Persistence** A 'never say die' attitude, not giving up easily, striving hard, information seeking, continuously until success is achieved.
- Knowledge Acquires knowledge, consults experts, continously willing to learn and have an overall openness to ideas and information.
- Concern for High Quality of Work- Attention to details and observance of established standards and norms to achieve quality.
- **Commitment to Work** Taking serious efforts & personal pains to complete a task as scheduled.
- Efficiency Orientation- Highly concerned for conservation of time, money and effort.

Employability Skills - (NSQF) Entrepreneurship Skills : Theory 2.1.27

- **Systematic Planning** Breaking up the complex issues into parts, close examination of the parts and inferring about the whole; e.g. simultaneously attending to production, marketing and financial aspects (parts) and the overall business strategy (the whole).
- **Problem solving**-Observing the symptoms, diagnosing and taking corrective action to sort out problem.
- **Self-confidence** Not being afraid of the risks associated with business and relying on one's capabilities to successfully manage the entreprise.

- **Assertiveness** Conveying emphatically one's vision and convincing others of its value.
- **Persuasion** elicit support of others in the venture.
- Use of Influence Strategies- Providing leadership.
- **Monitoring** Ensuring the progress of the venture as planned.
- **Concern for Employee Welfare** Believing in employee well being as the key to **competitiveness and success** and initiating programmes for employee welfare.

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Identify and analyse the traits/ qualities required for an Entrepreneur

Objectives: At the end of this exercise you shall be able to

· identify and list out the qualities required for a person to be an entrepreneur

- make the questionnaires form and prepare the chart
- analyse your strengths and weaknesses for being an entrepreneur.

PROCEDURE

- Identify and list out the qualities required to be an entrepreneurial person.
- Arrange the qualities listed out in sequence.
- the qualities as he/ she
- Make an inventory of the qualities as he/ she possesses.
- Allange the qualities listed but in sequence
- Frame them in a questionnarie form.
- Prepare the chart as given below (Table 1), stating the columns as 'Questions', 'Quality' and 'Yes/No'.

Table 1

No.	Question	Quality	Yes/ No
01	Do you have a strong desire to be a winner?	Need to Achieve	
02	Do you have a quality of firmness?	Perseverance	
03	Do you prefer a middle of the road strategy when you	Moderate Risk Taker	
	have analysed a risky problem objectively and think		
	you can solve it?		
04	Are you alert to opportunities? Do you seize them	Opportunity Sensing	
	and convert it to your advantage?		
05	Are you unaffected by personal likes and dislikes	Analytical Ability	
	while approaching problems?		
06	Do you find it important to know how you are doing,	Using Feedback	
	when you are working on a goal or a task?		
07	Do you welcome tackling an unfamiliar but	Facing Uncertainty	
	interesting situation?		
08	Do you have a dislike for working for others?	Independence	
09	Are you flexible in your decisions?	Flexibility	
10	Do you think ahead, plan your future and then	Planner	
	work to make it come true?		
11	Are you comfortable while dealing with people	Interpersonal Skills	
	at all levels?		
12	Can you influence others?	Motivator	
13	Are you capable of working for long hours and tackling	Stress Taker	
	different problems at the same time?		
14	Are you aware of yourself?	Positive Self Concept	
15	Do you tend to think ahead?	Orientation To Future	
Asl	k vourself each question, analyse it and answer the	Make self awareness and a	nalvse vour/his/her

question by ticking 'Yes' or 'No' in the chart.

- Complete the answers for all questions in the chart.
- Make self awareness and analyse your/his/her strength, so that they can overcome their weakness.

No entrepreneur has all these qualities. But most of them will have many.

Theory 2.1.28

Entrepreneurial motivation, performance and record, Entreprenurial opportunities

Objectives: At the end of this lesson you shall be able to

- state entrepreneurial motivation
- state entrepreneurial performance and reward
- state entrepreneurial opportunity, understands local demand
- able to decide a product based on analysing techno-economic survey reports.

Entrepreneurial Motivation

The word 'motivation' has its origin in the Latin word 'movere,' meaning "to move." psychologically, it means an inner or environmental stimulus to action, forces or the factors that are responsible for initiation, sustaining (and restraining/abstaining from) behaviour.

Entrepreneurial motivation may be defined as the process that activates the entrepreneurs to exert a high level of effort for the achievement of his/her goal. In other words, Entrepreneurial motivation refers to the drive or forces within an entrepreneur that affects his/her direction, intensity and persistence of voluntary behaviour.

You will be amazed to learn that different people engage in the same behaviour for different reasons. In other words, motivations may be diverse, multiple and dynamic. Three people participated in a marathon along with hundreds of others. None of them won the race. Does it mean that those three people were Losers? Not at all. Each went into the races with different objectives. The first ran the race to test his endurance and he came out better than his expectation. The second wanted to improve on his previous performances, he did. The third person had never run a race- his objective was to complete the race & he did. Each of these three entered the race with different objectives; they all met them, and they were all winners, regardless of who won the medal. Thus, 'motives' may be different and so be the perception of success. A person may work hard and long for money, the other may just be happy with a word of appreciation.

Entrepreneurial performance and rewards

Entrepreneurial performance may refer to measure (s) of business success and the rewards may refer to the

recompense, financial or psychic accruing to the entrepreneur. The convergence is attained when and where the success of the venture itself is perceived as a personal reward.

Entrepreneurial performance

The various measures of business performance include, longevity of survival or more popularly 'age of the enterprise,' sales growth, growth in market share, growth in market scope (local, national or international), growth in investment (in the same unit), additional units created via acquisition & diversification growth in number of employees, profits and so on.

Most of these are physical growth and financial growth parameters and have been the traditional measures of entrepreneurial performance. Of late, other measures of performance such as customers' satisfaction, employee satisfaction, image, credit rating, etc. are also becoming increasingly relevant. These measures are typically referred to as 'stakeholder-based' parameters.

As the small firms grow into acquiring corporate identities, 'market' based parameters such as stock price, EPS etc., may also be the relevant measures of entrepreneurial performance.

The entrepreneur is interested in feedback on the performance, one is always trying to compare how one is doing in relation to others. If there is no one to compete, the entrepreneur seeks to improve upon his previous record! It is in this context that the entrepreneurial performance becomes a source of personal reward.



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Entrepreneurial rewards

The personal rewards of entrepreneurship extend beyond business performance. Do the rewards indicates the outcomes of the activity or the activity itself? Often one draws a distinction between extrinsic rewards and intrinsic rewards.

Intrinsic Rewards : As the names would suggest, intrinsic rewards vest in the activity itself- ask a musician the joy of making music, the craftsman or the artist the joy of creative work or a cricketer the joy of playing the game! Likewise, the entrepreneur enjoys the creativity and innovativeness that he brings to his venture. This aspect of entrepreneurship may be so dear to the entrepreneur, that he may happily work for other commonly perceived physical and financial parameters of performance. Many entrepreneurs, strive hard for the prosperity and flourish of Entrepreneural Performance

Every business is a source of livelihood to many employees and their families. Thus, the entrepreneurs derive immense satisfaction in their ability to 'touch' other's lives. This they can do also by introducing products and services that bring about improvement in others' lives, be it a pharmaceutical formulation, daycare, home entertainment, leisure and so on.

Extrinsic Rewards: One reason an individual may desire to be on one's own could be that one is looking for the profit pie rather than mere a share in it! Apart from income and wealth that business ownership may bring forth, it may also be a source of career continuity for family members of the entrepreneur.

Entrepreneurial opportunity

Entrepreneurial opportunity emerges at the nexus of individual aspiration with economic & social conditions perceived as favourable to create a new product or service either in an existing market or a new one.

The entrepreneur to be succesful in his attempt, should know the employment opportunities existing in the location where he is setting up the venture.

The employement opportunities are generally based on the availability of local rawmaterial resources, skill of labourers, proximity to the market, and the gap between the supply and demand of the product locally.

The entrepreneur can select suitable industrial opportunies based on:

- 1) Agro based industries
- 2) Mechanical & metallurgical based industries
- 3) Electrical/ electronic industries
- 4) Ceramic industries
- 5) Food based industries
- 6) Local demand based industries

To select an industry, enterpreneur should consult MSME official, and also go through Techno economic survey report prepared by the industries dept as a guide in selecting the employment opportunity.

Buying and selling venture (trading) is also covered as industrial activity. Service based industries is the best option, since the working captial required is very low and needs no marketing effort. Auto repair shop, car washing plant, flour grinding, welding shop, saloon etc., are some of the service based venture offering scope, in any developing area.

Exercise 2.1.28

Identify and analyse the abilities of an Entrepreneur

Objectives: At the end of this exercise you shall be able to

- prepare the parameters for skills required to become an entrepreneur and list out in the chart format
- examine and analyse each of the skills listed for yourself
- rate your skills in each area by circling the appropriate number.

PROCEDURE

- Identify and list out the skills required to become an entrepreneur.
- Prepare the chart with parameter of skills with degrees of rating skills as in Table -1

Table - 1

Skills	Rating				
	Low Medium			High	
Sales	1	2	3	4	5
• pricing					
sales planning					
negotiating					
customer service follow-up					
tracking competitors					
Marketing	1	2	3	4	5
advertising/promotion/public relations					
media planning and buying					
marketing strategies					
distribution channel planning					
pricing					
packaging					
Financial planning	1	2	3	4	5
cash flow planning					
bank relationships					
management of credit lines					
Accounting	1	2	3	4	5
bookkeeping					
 billing, payables, receivables 					
 monthly profit and loss statements/ balance sheets 					
Administrative	1	2	3	4	5
scheduling					
payroll handling					

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Personnel management		2	3	4	5
hiring employees					
firing employees					
motivating employees					
general management skills					
Personal business skills	1	2	3	4	5
oral presentation skills					
written communication skills					
computer skills					
organizational					
Intangibles	1	2	3	4	5
ability to work long and hard					
ability to manage risk and stress					
ability to deal with failure					
ability to work with and manage others					
Total					

- Examine each of the skills, listed in the chart.
- Ask yourself whether you possess some (or) all of the skills.
- Rate your skills in each area by circling the appropriate number, based rating scale given below (Scale 1 -5)

Scale 1	as low
Scale 2	as between low and medium
Scale 3	as medium
Scale 4	as between medium and high
Scale 5	as high

- Sum the numbers after rating your skills, and apply the following rating scale.
- If your total is less than 20 points, you should reconsider whether owing a business is the right step for you (< 50%).
- If your total is between 20 and 25, you are on the verge of being ready but you may be wise to spend sometime for strengthening some of your weaker areas.
- If your total is above 30, you are ready to start a new business now (> 75%).

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Sources of Business Ideas

Objective: At the end of this lesson you shall be able to **• list the various sources of business.**

Sources of Business Ideas

1 Look within yourself and examine your skills, talent, passion

One of the first sources to start when looking for business ideas or opportunities is to look within yourself. Most people miss this greatest source of business ideas because of ignorance, laziness and self doubts.

If you are talented or having a proven track record in a specific field, then it is time to analyze such skill or talent. To discover what you are good at or what business to start, you can begin by asking yourself the following questions:

- What skills or talents do you possess?
- What are your hobbies? What are you passionate about?
- Do you possess a skill that people are willing to pay for?
- 2 Keep up with current events and be ready to take advantage of business opportunities

Social happenings, events and trends are also sources of business ideas. If you are exposed to reading and watching news regularly and having the conscious intent of discovering business ideas, you will be amazed at how many business opportunities that your brain will generate.

Keep up with current events because it will assist you to identify market trends, new finds/products, information about industries and sometimes new ideas that have business possibilities and potentials.

3 Invent a new product or service

Do you possess a creative mind? Then you can invent product or services that have never existed in the past? To develop a creative mind, you need a mindset or perception that sees beyond problems. You have to look around and ask yourself:

What is the best solution for this situation or people's problem?

Then you can proceed to ask people about additional services that they would like to see. You need to think like great entrepreneurs such as Thomas Edison, Alexander Graham, Steve Jobs, etc.

To develop winning ideas, you need to concentrate on a specific target market and analyze and brainstorm business ideas for services that the group would be interested on. The key to arriving at business ideas for a new product or service is to identify a market need that has not being met.

4 Add value to an already existing product

The uniqueness between raw wood and finished timber is a nice instance of putting a product through an additional process which maximizes its value, but additional processes are not the only way that value can be added. You may as well add services or combine the product with other related products.

5 Franchising

A franchise is just an arrangement whereby the manufacturer or the sole distributor of a trademark, product or service grants exclusive rights for local distribution to independent retailers in return for their payment of conformity and royalties in order to standardize operating procedures. Franchising may take several forms, but the most interesting one is the type that offers a name, method of running business, image and operating principles.

Now how can franchising become a source of business opportunities? Well, you can look at good companies or products that exist in other countries but are not operating your country. Then you can purchase a franchise to that product and become a pioneer in your country.

6 Mass media

The mass media is a wonderful source of information, ideas and offer opportunities. Magazines, TV stations, Cable networks, radio, newspapers and internet resource sites are all instances of mass media. Just take a careful look at the commercial advertisements in newspaper or magazine and you will discover new business that are for sale.

Also, articles in the printed press or on the net or documentaries on television may report changes in consumer needs or fashions. For instance, you may read or hear that people are now highly interested in healthy eating or physical fitness. You may as well discover advertisements calling for the provision of certain services depending on skills. Or you might find out a new concept for which investors are needed, such as a franchise.

7 Exhibitions, Expos and Trade shows

Another means to discover business ideas and opportunities is to attend exhibitions and trade fairs. These are usually advertised on the radio or in newspapers. By visiting such events regularly, you will not only find out new products and services, but you will as well meet sales representatives, wholesalers, distributors, manufacturers and franchisers. These are always excellent sources of ideas in business. E N

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8 Industrial Surveys

The main point for a new business idea should be the customer. The needs and wants of the customer, which will provide the rational for a product or service, can be analyzed or ascertained through a survey. Such a survey may be conducted formally or informally by speaking to people; usually through interviews or using a questionnaire or through observation.

9 Listen to customers complaints

Complaints and frustrations on the part of customers have led to many new products or services. Whenever consumers complain badly or bitterly concerning a product or service, or when you hear someone saying 'I wish there was ... "or "If only there were a product/service that could ... ", then, you have the potential for a business idea. The idea can be to set up a rival company offering a better product or service, or it may be a new product or service which can be sold to the company in question or to others.

10 Brainstorming

Brainstorming is a creative problem-solving technique, and also a source for generating ideas. The object is to arrive with as many ideas as possible. It usually begins with a question or problem statement. For instance, you may ask "What are the products and services required in the home today which are unavailable?" Each idea can lead to one or more additional ideas, resulting in a good number.

Brain storming may help in identifying the industries that may offer good scope for development.

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Exercise 2.1.29

The process of setting up a small Business (a schematic representation)

Objectives: At the end of this exercise you shall be able to

trace and interpret the sequence of operation for setting up a small business from the flow sequence diagram
 draw a similar diagram for the product chosen by you.

PROCEDURE

- Trace the sequence operation steps for setting a small business in the given schematic diagram. (Fig 1)
- Interpret the steps to be executed in sequence from the flow diagram.

Steps in setting up a small business - A schematic representation



Enterpreneur : Is a person who owns an enterprise.

Business Enterprise: Business Enterprise set up can be a manufacturing venture, a trading firm or a service establishment.

The following 24 steps are involved in setting up small industrial enterprises.

- 1 Deciding for business: This is the most crucial decision a youth has to take when he/she avoid wage employment and opting for self-employment / entrepreneurship.
- 2 Analysing Strengths/Weaknesses: This enables him/her to know what type and size of business would be most suitable. This varies from person to person.
- **3 Training:** To overcome our weakness or for improvement, training is required.
 - i) Developing skills for entrepreneurship.
 - ii) Developing technical/trade skills for proposed product/project.
- 4 Environmental Scanning: It is essential to study and understand our surroundings to know the business opportunities and threats in the environment. This will assist in proper project Identification and selection.
- **5 Product Selection:** The next step is to decide what business to venture into, the product or range of products that shall be taken up for manufacture and in what quantity.
- 6 Market Survey: It is easy to manufacture an item but difficult to sell; So survey the market before production and ensure the product chosen is in sufficient demand; ascertain changes in product design required; determine demand-supply lag, extent of competition, potential share of the market possible, pricing and distribution policy etc. The principle is to produce what people demand in a form and quantity that can be easily sold.
- 7 Form of Ownership: A firm can be constituted as proprietorship, partnership. Limited Company (Public or Private), Co-operative Society etc. This will depend upon the type, purpose and size of your business. One may also decide on the form of ownership based on resources on hand or from the point of saving on taxes.
- 8 Location: Decide where the unit is to be located it may be owned or hired. The location can even be your own residence subject to No-objection Certificate from Municipal Corporation/Local Body.
- **9 Technology:** Choose that technology which gives least cost of production/unit and good quality.
- **10 Machinery and Equipment:** Choose the suitable machinery and equipment required for manufacturing the chosen product. Identify the supplier and estimate the cost.

- **11 Project Report:** After deciding on the form of ownership, location, technology for manufacturing, machinery and equipment, one is ready to prepare a feasibility study or one's project report. The economic viability and technical feasibility of the product selected has to be established through a project report. A project report that may now be prepared will be helpful in formulating the financial, production, marketing and management plans.
- 12 Finance: Money is no problem for starting a smallscale industry. But an entrepreneur has to take certain steps and follow specified procedures to obtain it. A number of financial agencies will give loans on concessional terms. Under TRYSEM, SGSY and PMRY schemes entrepreneurs are also eligible for subsidies, which obviate the need for margin money.
- **13 Provisional Registration:** Having prepared a project report the entrepreneur may like to get the unit registered. This requires submitting an application for provisional registration to local DIC or Directorate of Industries on prescribed form. This is not essential but desirable, as it will enable you to avail various government facilities, incentives and assistance schemes including financial assistance from NSIC or SFC.
- 14 Technical Know-how: In quite a few cases technical know-how may have to be arranged. This can be through TCO, NSIC, SSIDC, Private Consultants, SISI, foreign collaborators or even machinery suppliers. Facilities are available to SSI for making variety of technical know-how arrangements, including turn key jobs.
- **15 Power Connection:** The site chosen should either have adequate power connection in the desired form or this should be arranged now, One can calculate the total power requirement, voltage and phases (single or three).
- **16 Installation of Machinery:** Having arranged finance, work shed, power etc. the next step is to procure machinery and begin its Installation. This should preferably be as per plant layout.
- 17 Recruitment of Manpower: Once machines are installed manpower will be required to run them. So finally determine and type (skilled, semi-skilled, unskilled, administrative etc.) of labour required, source' of obtaining Identified labour and recruit. Possibly labour has to be trained either at the entrepreneur's premises or in a training establishment.
- 18 Raw Material: Procure the raw material for production. Raw Material required may be available indigenously or, may have to be Imported, Government agencies can assist if raw material required are scarce or imported.

Employability Skills - (NSQF) Entrepreneurship Skills : Exercise 2.1.29

19 Production: There should not be any wastage of manpower, material or machine capacity installed. If items produced are exported then the product packaging must be appropriate.

Production of proposed Items should be taken up in two stages:-

- a) Trial production
- b) Commercial production

Trial production helps in tackling problems confronted in production and test marketing of the products. This reduces chances of losses in the eventuality of mistakes in project conception. Only after successfully launching the product should commercial production be commenced.

- **20 Marketing:** The process of determining likely markets, product design, selling, after sales service, feedback and meeting changing customer demand is called marketing.
- **21 Quality Assurance:** After or, at times before marketing the product. Quality certification like BIS, 'Q' Mark, Agmark, etc.,(depending upon the products should be obtained. If there are no quality standards specified for the products the entrepreneur should evolve and ensure his/her own quality control parameter; for long-term success.

- **22 Permanent Registration:** Once the unit is in regular production and marketing one may go in for obtaining permanent registration.
- 23 Marketing Research: Once the product or service is introduced in the market, there is a need for continuous market research to assess needs and areas for modification, upgradation and growth.
- **24 Monitoring:** Periodical monitoring and evaluation of production, quality, marketing and profitability helps in knowing where the firm stands in comparison to performance envisaged.

Setting up of the enterprise is not the final aim. It is just the Initial step. Growth of enterprise should be the ultimate ambition and is possible only if foundation at the project implementation stage was right. Through the above 24-step process one can ensure the successful setting up of a small Industrial enterprise.

Note: All the 24 steps for starting an enterprise is arranged in cyclic orders and no step should be skipped or altered by jumping or by zig-zag manner.

Micro, Small and Medium Enterprises (MSME)

Objectives: At the end of this lesson you shall be able to

- define Micro, small and medium enterprises (MSME)
- compare manufacturing enterprise and servicing enterprises
- list out the factors to create opportunities for small-scale sector
- list out the characteristics of small scale entrepreneurs
- list out the differences between small scale and large scale business.

In accordance with the provisions of Micro, Small & Medium Enterprises Development (MSMED) Act 2006, the Micro, Small and Medium Enterprises (MSME) are classified into manufacturing enterprises and service enterprises:



Manufacturing Enterprises: The enterprises engaged in the manufacture or production of goods. The manufacturing enterprises are defined in terms of investment in plant & machinery.

Service Enterprises: The enterprises engaged in providing or rendering of services are defined in terms of investment in equipment.

(A) MANUFACTURING ENTERPRISES		
(Ceiling LIMITS on investment in Plant & Machinery)		
(i) Micro Manufacturing Enterprises:	The investment in plant and machinery does not exceed Rs.25 lakhs.	
(ii) Small Manufacturing Enterprises:	The investment in plant and machinery is more than Rs. 25 lakhs butdoes not exceed Rs. 5 Crores.	
(iii) Medium Manufacturing Enterprises:	The investment in plant and machinery is more than Rs. 5 Crores but does not exceed Rs.10 Crores.	

(B) SERVICE ENTERPRISES				
(Ceiling LIMITS on investment in Equipment)*				
i) Micro Service Enterprises:	The investment in equipment does not exceed Rs. 10 lakhs.			
(ii) Small Service Enterprises:	The investment in equipment is more than Rs. 10 lakhs but does not exceed Rs. 2 Crores.			
iii) Medium Service Enterprises:	The investment in equipment is more than Rs. 2 Crores but does not exceed Rs. 5 Crores.			

Note : *The above ceiling limits were classified as on January 2011, this ceiling limit will vary from time to time.

The opportunities in the small-scale sector are enormous due to the following factors:-

- Less capital intensive.
- Extensive promotional & support by the Government.
- Reservation for exclusive manufacture by small scale sector.
- Funding Finance & subsidies (Transport, capital & quality control).
- Ease of machinery procurement.

- Raw material procurement/ allotment.
- Manpower training.
- Technical & managerial skills.
- Tooling & testing support by Government agencies.
- Reservation for exclusive purchase by Government.
- Export promotion
- Growth in demand in the domestic market size due to overall economic growth.
- Increasing export potential for Indian products.

ENTREPRENEURSHIP SKILLS

2 They are hard working, self confident and follow a

planned approach

3 They have minimum basic education

4 They are trained and /or experienced

8 They generally deal in one product.

5 Their area of operation is small

6 They employ fewer people

7 Their turnover is small

- Ability to provide goods at low price
- Increasing demand for consumer product
- Growth in requirements for ancillary units due to the increase in number of Greenfield units coming up in the large scale sector. Small industry sector has performed exceedingly well and enabled our country to achieve a wide measure of industrial growth and diversification.

Characteristics of small scale entrepreneurs

1 They are energetic, enthusiastic and goal oriented

Difference between small scale business and large scale business

Small Scale Business	Large Scale Business
It employs less number of persons and capital.	It employs a larger number of persons and huge capital.
Most of the work is done by manpower, small machines and tools.	The work is done mostly by larger machines and more of automation.
Raw material used are very less and the production is consequently low.	Raw material used is large and there is mass production in large quantities.
They are scattered in rural and urban areas and are in the private sector, e.g. cycle, T.V., radio.	They are located in urban centres and are in the public sector or run by big industrialists, e.g., Cotton textiles, Jute textiles, car manufacturing etc,.

Employability Skills - (NSQF) Entrepreneurship Skills : Theory 2.1.30

PLC, sales and distribution management

Objectives: At the end of this lesson you shall be able to

- describe product life cycle (PLC) and its various stages
- state the limitation of PLC
- describe sales management & its importance
- describe sales budget
- describe distribution management & its various channels.

The Product Life Cycle (PLC)

A Product's Life Cycle (PLC) can be divided into several stages characterized by the revenue generated by the product. If a curve is drawn showing product revenue over time, it may take one of many different shapes, an example of which is shown below: (Fig 1)



The life cycle concept may apply to a brand or to a category of product. Its duration may be as short as a few months for a food category item or a century or more for product categories such as the gasoline-powered automobile.

Product development state is the incubation stage of the product life cycle. There are no sales and the firm prepares to introduce the product. As the product progresses through its life cycle, changes in the marketing mix usually are required in order to adjust to the evolving challenges and opportunities.

Introduction stage

When the product is introduced, sales will be low until customers become aware of the product and its benefits. Some firms may announce their product before it is introduced, but such announcements also alert competitors and remove the element of surprise. Advertising costs typically are high during this stage in order to rapidly increase customer awareness of the product and to target the early adopters. During the introductory stage the firm is likely to incur additional costs associated with the initial distribution of the product. These higher costs coupled with a low sales volume usually make the introduction stage a period of negative profits. During the introduction stage, the primary goal is to establish a market and build primary demand for the product class. The following are some of the marketing mix implications of the introduction stage:

- **Product :** One of few products, relatively undifferentiated.
- **Price**: Generally high, assuming a skim pricing strategy for a high profit margin as the early adopters buy the product and the firm seeks to recover development costs quickly. In some cases a penetration pricing strategy is used and introductory prices are set low to gain market share rapidly.
- **Distribution :** Distribution is selective and scattered as the firm commences implementation of the distribution plan.
- Promotion : Promotion is aimed at building brand awareness. Samples or trial incentives may be directed toward early adopters. The introductory promotion also is intended to convince potential resellers to carry the product.

Growth stage

The growth stage is a period of rapid revenue growth. Sales increase as more customers become aware of the product and its benefits and additional market segments are targeted. Once the product has been proven a success and customers begin asking for it, sales will increase further as more retailers become interested in carrying it. The marketing team may expand the distribution at this point. When competitors enter the market, often during the later part of the growth stage, there may be price competition and/or increased promotional costs in order to convince consumers that the firm's product is better than that of the competition.

During the growth stage, the goal is to gain consumer preference and increase sales. The marketing mix may be modified as follows:

- **Product :** New product features and packaging options, improvement of product quality.
- **Price :** Maintained at a high level if demand is high, reduced to capture additonal customers.
- **Distribution** : Distribution becomes more intensive. Trade discounts are minimal if resellers show a strong interest in the product.

E N • **Promotion** : Increased advertising to build brand preference.

Maturity stage

The maturity stage is the most profitable. While sales continue to increase into this stage, they do so at a slower pace. Because brand awareness is strong, advertising expenditures will be reduced. Competition may result in decreased market share and/or prices. The competing products may be very similar at this point, increasing the difficulty of differentiating the product. The firm places effort into encouraging competitors customers to switch, increasing usage per customer, and converting non-users into customers. Sales promotions may be offered to encourage retailers to give the product more shelf space over competing products.

During the maturity stage, the primary goal to maintain market share and extend the product life cycle. Marketing mix decisions may include:

- Product : Modifications are made and features are added in order to differentiate the product from competing products that may have been introduced.
- **Price** : Possible price reductions in response to competition while avoiding a price war.
- **Distribution** : New distribution channels and incentives to resellers in order to avoid losing shelf space.
- **Promotion :** Emphasis on differentiation and building of brand loyalty. Incentives to get competitors customers to switch.

Decline stage

Eventually sales begin to decline as the market becomes saturated, the product becomes technologically obsolete, or customer tastes change. If the product has developed brand loyalty, the profitability may be maintained longer. Unit cost may increase with the declining production volumes and eventually no more profit can be made.

During the decline phase, the firm generally has three options:

- Maintain the product in hopes that competitors will exit. Reduce costs and find new uses for the product.
- Harvest it, reducing marketing support and costing along until no more profit can be made.
- Discontinue the product when no more profit can be made or there is a successor product.

The marketing mix may be modified as follows:

- **Product :** The number of products in the product line may be reduced. Rejuvenate surviving products to make them look new again.
- **Price** : Prices may be lowered to liquidate inventory of discontinued products. Prices may be maintained for continued product serving a niche market.

- Distribution : Distribution becomes more selective. Channels that no longer are profitable are phased out.
- **Promotion :** Expenditures are lower and aimed at reinforcing the brand image for continued products.

Limitations of the product life cycle concept

The term "life cycle" implies a well-defined life cycle as observed in living organisms, but products do not have such a predictable life and the specific life cylce curves followed by different products vary substantially. Consequently, the life cycle concept is not well-suited for the forecasting of product sales. Furthermore, critics have argued that the product life cycle may become selffulfilling. For example, if sales peak and then decline, managers may conclude that the product is in the decline phase and therefore cut the advertising budget, thus precipitating a further decline.

Nonetheless, the product life cylce concept helps marketing managers to plan alternate marketing strategies to address the challenges that their products are likely to face. It also is useful for monitoring sales results over time and comparing them to those of products having a similar life cycle.

Sales Management

To produce a product is much more easier than selling the product and hence suitable management methods have to evolved for better selling.

What is sales management?

It is the management of personal selling part of a company's management function. It is also the process of planning, devicing, controlling & personal selling, equipping, remitting, assigning, suspension and motivating personal sales force.

Sales management covers the following area

- Sales promotion
- Market research
- Sales activity
- · Logistics market
- Customer service

Importance of personal selling & sales management

- The only function/department in a company that generates revenue income.
- The financial results of a firm depend on the performance of the sales department/sales management.
- Many sales people are among the best paid people in business.
- It is one of the fastest & surest routes to the top management.

Employability Skills - (NSQF)

Entrepreneurship Skills : Theory 2.1.31 17

Sales objective, Strategies & Tactics.

The main components of planning in a company are objectives, strategies and tactics.

The management set objectives & to achieve the objectives develop certain strategies leading to evolution of tactics and action plans.

Emerging trends in sales management are

- Global perspective
- Revolution in technology
- Customer Relationship Management (CRM)
- · Sales force diversity
- Team selling approach
- · Managing multiple channels
- Ethical & Social issue
- Sales professionalism

What is sales budget?

It includes estimate of sales volume & selling expenses. Sales volume budget is derived from company sales forecast.

Sales budget gives a detailed break-down of estimates of sales and revenue & selling expenditure. Purpose of sales budget is to plan, coordinate and control the activities.

Distribution management

Management of all activities which facilitate movement and co-ordination of supply and demand in the creation of time and place utility in goods. It is an art of determining requirements acquiring them and finally maintaining them in an operationally ready condition for their entire life.

Distribution channels defined are sets of interdependent organizations involved in the process of making a product or service available for use or consumption. Whether selling products or services, marketing channel decisions play a role of strategic importance in the overall presence and success a company enjoys in the market place.

Type of Channels

- **Sales** channel motivates buyers, share information between company and its consumers, negotiates fair bargains for consumers and finance the transaction.
- **Delivery** channel meant only for physical part of the distribution
- Service channel performs after sales services.

Distribution channel members are

- · Company's own sales team
- · Distributors, dealers, stockists
- · Agent and brokers
- Franchises
- Electronic channels
- whole salers
- Retailers

Four Channels through which marketers can reach customers



Employability Skills - (NSQF) Entrepreneurship Skills : Theory 2.1.31

Theory 2.1.32

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Method of Marketing, Advertisement & Publicity, Market mix

Objectives: At the end of this lesson you shall be able to

- explain the types of business in different trades and importance of skills
- explain consumer behaviour and market survey
- explain the concept of marketing
- state the methods of marketing
- explain the concept of advertisement
- state the meaning of market mix.

What are the areas in which one can successfully run his/her enterprise?

Before choosing a suitable career in self-employment one must collect some idea about the areas in which selfemployment opportunities are available. Let us categorise the avenues of self-employment into the following broad areas.

Types of Business in different trades

Trading

Trade involves buying and selling of goods and services. With small amount of investment one can start and run a small trading unit. One can think of starting a small grocery or stationery shop in his locality. If you are able to invest more capital and ready to take risk, then wholesale business is a good option for you. One can also take up some agency business or become a stockist. The real estate business which is booming nowadays can also be a lucrative alternative.

Manufacturing

One can start a small industry of manufacturing bricks, or producing bakery items or confectionery. All these businesses require small amount of capital and simple equipment. Farming is another such area in which a person can work all alone or take the help of one or two persons. This is an age-old area of self-employment. Orchards, dairy, poultry, sericulture, fisheries, horticulture, etc. are good examples of avenues of self-employment.

Professionals

Occupations that require special knowledge and training in a particular field also provide opportunities of selfemployment. Lawyers, doctors, chartered accountants, architects and journalists fall in this category. However one has to follow certain code of conduct framed by their association and need specialized knowledge and training.

Individualised services

Tailoring, motor repairing, hair cutting, fashion designing, interior decoration etc. are some of the business activities, which provide individualised services to the consumers. These can be easily started and run by individuals. These activities are based on the personal skills of those who perform them. Blacksmiths, carpenters, goldsmiths are all self-employed persons.

Consumer and behaviour

The most influential force which rules the market is the 'Consumer'. Consumer Satisfaction is the foundation stone of a successful business.

Consumer behaviour is the study of when, why, how, and where people do or do not buy product. It blends elements from psychology, sociology, social anthropology and economics. It attempts to understand the buyer's decision making process, both individually and in groups. It studies characteristics of individual consumers such as demographics and behavioural variables in an attempt to understand people's wants. It also tries to assess influences on the consumer from groups such as family, friends, reference groups, and society in general.

Consumer Behaviour

Customer behaviour study is based on consumer buying behaviour, with the customer playing the three distinct roles of user, payer and buyer. Relationship marketing is an influential asset for customer behaviour analysis as it has a keen interest in the re-discovery of the true meaning of marketing through the re-affirmation of the importance of the customer or buyer. A greater importance is also placed on consumer retention, customer relationship management, personalisation, customisation and oneto-one marketing. Social functions can be categorized into social choice and welfare functions.

Consumers' buying Behaviour:

- (i) Buying habits
- (ii) Living habits
- (iii) Purchasing power
- (iv) Attitude and preferences
- (v) Local environment, situations
- (vi) Number of consumers of the product

Market Survey

To compete the present market scenario, the day to day information is essential for the organization and its long term survival.

A market survey is an important requirement for initiating any successful business. The objective of a market survey is to collect information on various aspects of the business. This survey is a tool through which we can minimize risk. After the market survey, the results must be analyzed in order to finalize a business plan.

Through a market survey we can obtain information in the following areas:

• Size and location of market.

For example, how many sellers in the market, Area of market etc.

• Pattern of demand.

For example, size of demand, possibility of increase of demand, seasonal demand, demand creation etc.

Buying habits and motives.

For example, who are the customer (age group, sex, and economical status), consumer buying behaviour, consumer choice etc.

- Past and present trends for this or other products.
- Competitors details

Who, where and how many are they?

Quality & quantity of their product.

Their monopoly area and weaknesses.

If market survey is not conducted entrepreneur will have no information about purchasing power, age group, target market of the consumer. This will end up in making wrong decision about production capacity, customer availability. Most of business fail due to wrong location, wrong product selection.

Marketing

Marketing is the management process responsible for identifying, anticipating, and satisfying customer requirements profitably.

In simple terms, marketing relates to selling of products or service by generating a strategy that underlies sales techniques, business communication, and customer relations. It begins with the customer (by finding their needs) and ends with the customer (by satisfying their needs). Marketing is all about 4 P's (Product, Price, Place and Promotion)

Marketing is different from selling. Marketing starts with buyer and focuses constantly on buyer's need whereas selling focuses on selling need.

Small-scale enterprises could successfully adopt with the advantage of some of the following techniques of sales promotion.

Direct promotion techniques

- · Displays and demos.
- · Advertising through various media.
- Publicity.
- Sales connected with special events, like exhibition, seasonal offer sale.
- · Personal selling tactics.

Indirect promotion techniques

- · Efficient customer services.
- Public relations.
- · Cordial customer relations.
- · Appropriate product design/style/packaging.
- · Goodwill of the community.

The new entrepreneur should make every endeavour to win the support of his wholesalers and retailers. Wholesalers could be encouraged to handle his product by offering financial incentives and substantial concessions. Besides, the manufacturer should actively participate in marketing by maintaining a systematic check on the effectiveness of his distribution channels. He should also find new markets for his products and should be able to compete with his fellow-producers.

Methods of marketing

- Print advertisement for example in newspapers and magazines. It reaches lots of people.
- TV/Radio Advertisement for example to advertise promotions and competitions or events
- Leaflets for example door to door, shops, posters, tradeshows, cafe. It is simple, cheap and focuses on local area only.
- Incentives Incentives like cash voucher, percentage discount, free product, priority customers etc.
- Free publicity for example a story or newsworthy event in local or national newspapers, radio, TV or award ceremony. Positive media can increase result in sale.
- Websites advertisement can be put on website.
- Online advertisement.
- Social media-for example blogging, facebook, linkedin, youtube and twitter. Social networking can be a great way of building up the clients and promoting developments in business
- Word of mouth through friends, family customers and even competetors. A happy customer is a best form of marketing.

Employability Skills - (NSQF) Entrepreneurship Skills : Theory 2.1.32

ENTREPRENEURSHIP SKILLS

Publicity

Publicity is an unpaid mention of the company, its product and brand by the news media in newspaper, journals, website, radio or television. It is an uncontrolled form of promotion.

Favourable publicity increase the credibility and result in building faith in the product or company whereas unfavourable publicity will result in creating doubt in the mind of people for the product and company

The extent of truth is greater in publicity as compared to advertising.

Advertisement

An activity which establishes non-personal contact with the customers regarding the product, idea and service. It is an effort to create and sustain the demand for the product. Advertisement is sponsored and paid for. It carries the message about quality and utility of the goods or services.

Purpose of advertisement

• To give information regarding the existence.

- To create new demand for the product
- To instruct about the use of the product
- To encourage the consumer
- To remove doubt and confusion about the products

Advertisement is a paid form of ideas goods and services while publicity is not paid by sponsors.

What is marketing mix?

It is a business tool used in marketing and by marketers. The marketing mix refers to the set of actions or tactics that a company uses to promote its brand or product in the market. It is crucial when determining a product or brand's offer and is often associated with the four 'P's (Price, Product, Place and Promotion). In service marketing, 4 'P's are expanded to 7 'P's to address different nautre of service.

Other three P's are Packaging Positioning & People. Marketing mix make up business plan for a company and handled right, can give it great success. If it not handled properly it will lead to a declined business and may take years to recover to orginal level.
Employability Skills - Entrepreneurship Skills

SWOT and Risk analysis

Objectives: At the end of this lesson you shall be able to

- explain the concept of SWOT analysis
- explain the benefits of SWOT analysis

explain the concept of risk analysis, management and assessment.

SWOT Analysis

SWOT is a strategic planning method used to evaluate a project's strengths, weakness, opportunities and threats.

Fig 1		
	HELPFUL TO ACHEIVING THE OBJECTIVE	
INTERNAL FACTOR (ATTRIBUTES OF THE ORGANIZATION)	STRENGTHS	WEAKNESS
EXTERNAL FACTOR (ATTRIBUTES OF THE ORGANIZATION)	OPPORTUNITIES	THREATS
		0

Some examples of internal and external factors:

SWOT is mainly classified as

Internal factors - Strengths and Weaknesses

External factors - Opportunities and Threats

Strengths- Internal factors that are helpful to the organization to achieve its objective

Weaknesses - Internal factors that are harmful to the organization to achieve its objective

Opportunities - External factors that help the organization achieve its objective

Threats - External factors that are harmful to the organization to achieve its objective

Identification of SWOTs is essential because subsequent steps in the process of planning for achievement of the selected objective may be derived from the SWOTs. Setting the objective should be done after the SWOT analysis has been performed. This would allow achievable goals or objectives to be set for the organization.

The aim of any SWOT analysis is to identify the key internal and external factors that are important to achieve the objective.

Internal factors	
Strength (S)	Weaknesses (W)
 Excellent sales staff with strong knowledge of existing products Good relationship with customers Good internal communications High traffic location Successful marketing strategies Reputation for innovation 	 Currently struggling to meet deadlines - too much work? High rental costs Market research data may be out of date Cash flow problems Holding too much stock Poor record keeping

External	I factors
LALEINA	i lacturs

External factors	
Opportunities (O)	Threats (T)
• Similar products on the market are not as reliable or are more expensive	Competitors have a similar product
Loyal customers	 Competitors have launched a new advertising campaign
 Product could be on the market for Christmas 	 Competitor opening shop nearby
 Customer demand - have asked sales staff for similar product 	 Downturn in economy may mean people are spending less

Benefits of SWOT Analysis

SWOT analysis is a powerful model for many different situations. The SWOT tool is not just for business and marketing. Here are some examples of what a SWOT analysis can be used to assess:

- a company (its position in the market, commercial viability etc)
- a method of sales distribution
- a product or brand
- a strategic option, such as entering a new market or launching a new product
- an opportunity to make an acquisition
- a potential partnership
- project planning and project management.

Risk analysis

It is a technique used to identify and assess such factors that may jeopardize the sucess of a project or achieving the goal. This technique also helps to define preventive measures to reduce the probability of these factors from occuring & identifying counter measures to sucessfully deal with these constraints, when they develop to avert possible negative effects on the competitiveness of the company.

One of the these popular methods to perform Risk Analysis (RA) in the computer field is called FRAP (Facilitated Risk Analysis Process)

What is Risk Management (RM)?

"Dealing with risk is a part of governance and leadership, and in fundamental to how an organisation is managed at all levels" - defines ISO.

It is the identification assessment & prioritisation of risks (defined as the effect of uncertainty on objectives) as per ISO 31000, followed by coordinated and economical application of resources to minimize, monitor & control the probability or impact of fortune events, to maximize the realisation of opportunities.

Risks can come from uncertainty in :

- Financial markets
- Threats from project failure

- Legal liabilities
- Credit risk
- Accidents.
- Natural causes & disaster
- Events of uncertain or unpredictable root-causes.

The method of risk management may differ from unit to unit, or in :

- Project management
- Security management
- Engineering & Industrial process
- · Financial port folios
- Actuarial assessment
- · Public health and safety

The terms used in Risk Management (RM) are clearly defined by the ISO guide 73.

Principle of Risk Management (RM) should :

- Create value the gain should exceed the pain.
- Be an integral part of organisational process.
- Be the part of decision making process.
- Explicit address uncertainty & assumptions.
- · Be systematic & structured process.
- Be based on the best available information.
- Be flexible (not rigid)
- Be transparent
- · Be dynamic, interactive & respond to change.
- Be capable of continual improvement & enhancement.
- Product : P What products to make/sell
- Place : P Where to sell your product.
- Price : P How much your product gives the cost
- Promotion : Advertising, Personal selling, Sales promotion & Publicity

7P's : Place, Price, Promotion, People, Process, Physical environment and Product.

Employability Skills - Entrepreneurship Skills

Role of various schemes and Institutes for self-employment

Objectives: At the end of this lesson you shall be able to

- state the role of various schemes and institutes for self employment
- list out various schemes and institutes for self employment
- list out various financial institutes and bank for self employment.

Since making a choice of the right product is a difficult decision for an entrepreneur, there are many organisations and Institutes existing at both the Central and State level which can help him/her obtain an idea about the products and services that can be selected for promotion of an enterprise. Some of the important organisations are:-

District Industries Centres (DICs)

These were set up with a view to provide all sorts of assistance to the entrepreneurs under the single roof for the healthy growth of industry sector. These are set up in each districts by the respective State Govts.

Technical Consultancy Organizations (TCOs)

All India Financial Institutions in collaboration with state level financial/development institutions and commercial banks established a network of Technical Consultancy Organisations (TCOs) to cater to the consultancy needs of the small and medium industries and new entrepreneurs.

MSME Development Institutes (MSME-DIs)

In MSME-DIs, the new entrepreneurs are assisted in many areas: Identification/Selection of products of manufacture; selection of appropriate technology; manufacturing process and technique; selection of suitable plant & machinery; market information.

Khadi and Village Industries Commission (KVIC)

The KVIC is charged with the planning, promotion, organisation and implementation of programs for the development of Khadi and other village industries in the rural areas. Its functions also comprise building up of a reserve of raw materials and implements for supply to producers, creation of common service facilities for processing of raw materials as semi-finished goods and provisions of facilities for marketing of KVI products. Training of artisans engaged in different trades and encouragement of co-operative efforts are some of the services provided by KVIC.

Small Industries Service Institutes (SISIs)

SISI are setup one in each state to provide technical support and consultancy services, conduct entrepreneurship development programmes, and export promotion and liaison activities. It conducts EDP all over the country. It assists testing of raw materials and product of SISI, their inspection and quality control. It also advises central and state government on the policy matters related to small industry development.

National Small Industries Corporation Ltd. (NSIC)

The NSIC provides assistance in marketing the products of SSI sector both at home and abroad. The Corporation market products of SSI sector both under the Government Stores Purchase Programme (to meet the requirements of Govt. departments, Railways, Defence, etc.) and under its internal marketing programme through consortia approach.

State Government (Directorate / Commissionerate of Industries)

Each State Govt. has set up separate departments for the development and promotion of micro, small and medium-scale industries.

Small Industries Development Organisation (SIDO)

SIDO is a policy - making, coordinating & monitoring agency for the development of SS entrepreneurs. It maintains close liasion with govt, financial institutions & other agencies.

SIDO is to contribute to poverty eradication and enterprise developed thereby contributing to economic development through provision of demand driven services that will create employment and genarate income to the service user.

SIDA (Small Industries Development Agency)

This is a state promotional agency which provide single window service for SSI (Small Scale Industry) entrepreneurs.

SIDA provides assistance/guidance in respect of

- (i) Power connection
- (ii) Finance from bank/financial institution
- (iii) NOC for pollution.
- (iv) One time compromise settlement of SSI unit with bank financial institutions in case of sickness industry. It provide escort services to investors with proposed investment in plant and machinery.

Financial institutions and banks

Small Industries Development Bank of India (SIDBI)

SIDBI's financial assistance is available for marketing of SSI product, Setting up of new ventures, expansion, modernization, diversification of existing units for all activities.

Financing for procurement of Raw Material (Short term)

NSIC's Raw Material Assistance Scheme aims at helping Small Scale Industries/ Enterprises by way of financing the purchase of Raw Material (both indigenous & imported).

Financing for marketing activities (Short term)

NSIC facilitates financing for marketing actives such as Internal Marketing, Exports and Bill Discounting.

Finance through syndication with banks

In order to ensure smooth credit flow to small enterprises, NSIC is entering into strategic alliances with commercial banks to facilitate long term / working capital financing of the small enterprises across the country. The arrangement envisages forwarding of loan applications of the interested small enterprises by NSIC to the banks and sharing the processing fee.

Finance and development corporations (NFDC)

National Backward Classes Finance & Development Corporation (NBCFDC)

NBCFDC is a Govt. of India Undertaking under the Ministry of Social Justice and Empowerment. Established with an objective to promote economic activities for the benefit of Backward Classes, NBCFDC also provides financial assistance/ micro financing through SCAs/ Self Help Groups (SHGs). It assists a wide range of income generating activities in skill development and selfemployment ventures under following broad sectors:

- a Agriculture and Allied Activities and Small Business
- b Artisan and Traditional Occupation
- c Technical and Professional Courses
- d Transport and Service Sector etc.

National Scheduled Castes Finance and Development Corporation (NSFDC)

NSFDC was established to finance for the economic empowerment of persons belonging to the Scheduled Castes families including their skill upgradation.

Mission: Fighting poverty and Stigma through Entrepreneurship.

Objectives: NSFDC's main objective is to finance, facilitate and mobilise funds for the economic empowerment of persons belonging to the Scheduled Caste families living below Double the Poverty Line.

• National Minorities Development and Finance Corporation

The Corporation promotes economical and developmental activities for the backward sections amongst the minorities with preference to men and women.

- a Provision of finance for income generating activities at concessional rate of interest, through the SCAs.
- b Providing Micro Finance to the poorest of poor among minorities through NGOs.
- c Providing Educational Loans to persons belonging to minorities.
- d To organise vocational training programmes.
- e Design development and marketing assistance to artisan and craft persons.
- National Scheduled Tribes Finance & Development Corporation

Objectives:

- a Identification of economic activities of importance to the Scheduled Tribes so as to generate employment and raise their level of income.
- b Upgradation of skills and processes used by the Scheduled Tribes through providing both institutional and on the job training.
- c To innovate experiment and promote rather than replicate the work of the existing agencies.

National Safai Karamcharis Finance & Development Corporation (NSKFDC)

Objectives: To provide training to the target group to make themself-dependant through appropriate technical training in the field of traditional and technical occupations and entrepreneurship. Financial assistance is provided in the form of 100% grants imparting skills and entrepreneurial development. Grants upto a maximum of Rupees one lakh per project will be provided.

Types of Training Programmes

- a Institutional Linkages Programme (ILP)
- b Skill up-gradation Training Programme (STP)
- c Entrepreneurship Development Programme (EDP)

Financial Assistance for Skill & Entrepreneurial Development

To provide training to the disabled persons to make them capable and self-dependent through technical training in the field of traditional and technical occupations and entrepreneurship. Max. Rs. 5.0 lakhs.

Micro Credit Scheme, for

- a Small business/trade
- b Tiny/cottage industry or service activity
- c Artisan activities
- d Agricultural and allied activities
- e Transport sector activities which are involved in promotion & development of small scale units.

Employability Skills - Entrepreneurship Skills

Project formation, feasibility, legal formalities

Objectives: At the end of this lesson you shall be able to

- explain the project report, its feasibility, viability, estimation and costing, legal formalities
- describe briefly about the factors to be considered for the project report
- state about the fixed capital, working capital and methods of raising capital

describe the sources of financial institution for providing loans.

Preparation of business plan/project report

An entrepreneur possessing the keen aptitude for setting up a small industrial unit should, at the outset, formulate a comprehensive business plan giving a total visualisation of the firm before commencement of operations. The project report being compiled by the entrepreneur should accomplish the vital task of providing a 'bird's eye view' of the entire spectrum of activity.

Feasibility: A feasibility study is defined as a controlled process for identifying problems and opportunity, determining objectives, describing situations, defining successful outcomes and accessing the range of costs and benefits associated with several alternatives for solving problems. This would encompass factors such as description of the product specifications to be adopted, raw material availability as per requirements, outline of manufacturing process inclusive of a flow-process chart, quality control measures, power supply, availability of water, transport facilities and communication network.

Types of feasibility

- 1 Market feasibility includes current market, anticipated future market, potential competition etc.
- 2 Technical feasibility details of how to deliver a product.
- 3 Financial feasibility source of capital, how much start up capital is needed, returns on investment etc.
- 4 Organisational feasibility defines legal and corporate structure of business
- Economic viability: This essentially involves compilation of demand for domestic and export markets, most appropriately installed capacity requirements in regard to capital assets, evaluation of the production cost, capturing a substantial share of market sales, revenue expected, suitable price structure, and so on.
- Estimation and costing: Project cost covering nonrecurring expenses such as land and building, plant and machinery, pre-operative expenses and so on and recurring expenses such as working capital needs, raw material needs, wages for personnel, etc. will have to be worked out in detail.

The probable cost of production over a period of five years is to be assessed and expenses such as fixed expenses(consultancy, travel, salary, wages,rent advertisement etc) and variable expense(raw material, packing material, freight expenses etc) and 'breakeven' analysis should be presented.

Besides profit per month, percentage of profit on investment and percentage of profit on expected sales should also be computed and furnished.

• **Managerial competence:** The new entrepreneur manager entering the small-scale sector should devote his full attention to the new venture and should consider the product line chosen as a 'major economic activity'.

He should develop keen desire to adopt modern management practices for ensuring its successful growth. He should endeavor to put on the market a product in his own style in an innovative spirit without blindly imitating other brands

• Legal formalities: The shops and establishment act is a state legislation act and each state has framed its own rules for the Act. The objective of this Act is to provide statutory obligation and rights to employees and employers in the unauthorized sector of employment, i.e., shops and establishments. This Act is applicable to all persons employed in an establishment with or without wages, except the members of the employer family.

This act lays down the following rules:

- 1 Working hours per day and week.
- 2 Guidelines for spread-over, rest interval, opening and closing hours, closed days, national and religious holidays, overtime work.
- 3 Employment of children, young persons and women.
- 4 Rules for annual leave, maternity leave, sickness and casual leave, etc.
- 5 Rules for employment and termination of service.

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Creating a business plan/ Project report

Every new venture should have a business plan. A business plan is the formal written expression of the entrepreneurial vision, describing the strategy and operations of the proposed venture. The business plan when it is intended to be presented to a banker, it may be called a "loan proposal."

The advantages of writing a business plan of the firm is to think about their business in a comprehensive way, to communicate their objectives, to have a basis for making decisions, and to facilitate the planning process.

Entrepreneurs should undertake the task of preparing the business plan personally. Although consultants/ accountants should be tapped for their advice and expertise, the promoter should be responsible for the writing. Personally drafting the plan will enable the entrepreneurs to think through all aspects of the proposed business and ensure that they are familiar with all the details, for they will have to make decisions about the new venture and be responsible for those decisions.

Arranging finance: Financing a start-up business

One needs money to make money. A business firm requires finance to commence its operations, to continue its operations and for its expansion and growth. There must be continuous flow of funds in and out of business.

Sound plans, efficient production and marketing are all dependent on smooth flow of finance.

Hence, a financial plan needs to be prepared, which indicates the requirements of finance, sources for raising the finance and the application of funds.

Financial planning for starting a business begins with estimating the total amount of capital required by the firm for the various need of the business.

The financial plans of an enterprise should be formulated by taking into consideration the following factors :-

- · The financial objectives of the company
- · Nature and size of the business
- · The image and credit-worthiness of the enterprise
- Growth and expansion plans
- Capital market trends
- Government regulations

Types of financial needs

Fixed capital

The funds required to purchase fixed or durable assets are known as fixed capital or long term capital. The fixed or durable assets include land, buildings, machinery, equipment, furniture etc. The nature and size of the business generally determines the amount of fixed capital needed. For e.g. manufacturing activities require large investments in plant, machinery, warehouses and others. While, trading concerns need relatively lesser investment in such assets.

These assets continue to generate income and profits over an extended period of time. Also, funds which are once invested in fixed assets cannot be withdrawn and put to some other use.

Working capital

Money invested in short term assets or current assets is known as working capital. It includes purchase of raw materials, payment of wages and salaries, rent, fuel, electricity and water, repairs and maintenance of machinery, advertising, etc. Besides, sale of goods on credit leads to the holding of debtors balance and bills receivable, which may also be regarded as current assets.

The requirement of finance for all these purposes arises at short intervals. Working capital is also known as Circulating Capital or Revolving Capital because funds invested in such assets are continuously recovered through realisation of cash, and again reinvested in current assets.

The amount of working capital required depends mainly on the nature of the business, the time required for completing the manufacturing process, and the terms on which materials are purchased and goods sold. For e.g. trading companies require more working capital than manufacturing companies.

Methods of raising capital

A company may raise funds for different purposes depending on the time periods ranging from very short to fairly long duration. The total amount of financial needs of a company depends on the nature and size of the business.

The scope of raising funds depends on the sources from which funds may be available. The business forms of sole proprietor and partnership have limited opportunities for raising funds. They can finance their business by the following means

- Investment of own savings
- Raising loans from friends and relatives
- Arranging advances from commercial banks
- Borrowing from finance companies

Budgeting considers all the operation as a whole and it is more extensive, and it is purely based on the projection of finacial accounts, which does not involve standardisation of the product. Whereas standard costing controls the expenses, it is projection of cost accounts and this costing cannot exist without budget.

Employability Skills - (NSQF) Entrepreneurship Skills : Theory 2.1.35

Cost estimating is a vital requirement for success of a project. Project underestimation of resources and cost is one of the most common contributors to the project failure. Cost estimation also referred as budgeting sometime, and is an interactive process of developing the monetary and other resources needed to produce a product. If the cost calculation is done prior to manufacutring, it is called as estimation, and if it is done for the pricing the product by adding all the costs towards production, it is called product costing. Whether it is estimation or costing the factors that include towards arriving at it is:

Labour (Both direct and indirect labour, also supporting staff)

Raw material (Both consumable and non-consumable)

Equipment and machinery

Services,

Software, hardware costs

Facilities,

Contingency costs.

Costing refers to the fixing the cost of a product by taking into account direct and indirect elements , and the factors determining the cost of a product are known as elements of cost.

The elements of cost can be material cost, Labour cost and the expenses.

Material cost refers to the cost of raw material used for production of a product

Labour cost refers to the wages paid to the workers in the manufacuturing department

Expenses refers to the expenditure by way of rent, depreciation, power etc.,

The cost can be broadly split into two types, namely Direct cost, and indirect cost.

The Direct cost expenditure includes material, direct labour expenses.

The indirect cost includes work of factory expenses, office and administrative expenses, selling, marketing and distribution expenses.

The detailed format for preparing the costing of a product is shown below:

Introduction : Costing refers to fixing the costs of a product. The factors which determines the cost of a product are known as elements of cost.

Elements of cost : There are three cost elements exist in costing. They are

- 1 Material cost
- 2 Labour cost
- 3 Expenses

- Material cost refers to the cost of raw materials used for production of a product.
- Labour cost refers to the wages paid to the workers in the manufacturing department.
- Expenses refers to the expenditure by the way of rent, depreciation, power etc,.

Concept of Direct and Indirect costs : The total expenditure may be classified as Direct cost and Indirect cost.

Direct cost : The expenditure which can be conveniently allocated to a particular job or product or unit of service is known as direct cost.

Direct expenditure is made up of

- 1 Direct materials
- 2 Direct labour
- 3 Direct expenses

Indirect cost : The expenditure which cannot be conveniently allocated to a particular job or product or unit of service is known as indirect cost.

In a firm producting a larger variety of articles most of the expenditure apart from materials and labour will be indirect.

Indirect expenditure is made up of

- 1 Works of factory expenses
- 2 Office and administrative expenses
- 3 Selling and distributive expenses

Cost classification : Cost classification is the process of grouping costs according to their common characteristics.

Costs may be classified according to their nature and number of characteristics such as function, variability, controllability and normality.

- 1 Nature : Costs are classified according to their nature as
 - a Material cost
 - b Labour cost
 - c Expenses
- 2 Function : According to the divisions of activity, costs can be classified as
 - a Production cost
 - b Admistrative cost
 - c Selling cost
 - d Distribution cost

Employability Skills - (NSQF) Entrepreneurship Skills : Theory 2.1.35

- **3 Variability** : According to their behaviour in relation to changes in the volume of production cost can be classified as
 - a Fixed cost
 - b Semi fixed cost
 - c Variable cost
- 4 **Controllability** : Costs are classified according to their influences by the action of a given member of an undertaking as
 - a Controllable cost
 - b Uncontrollable cost
- 5 Normality : Costs are classified according to the costs which are normally incurred at a given level of output as
 - a Normal cost
 - b Abnormal Cost

Presentation of total cost : The presentation of total cost according to their nature is shown here.

Statement of total cost

	Rs.
Direct material cost	
Direct wage	
Direct expenses	
"A" Prime cost	
Add : Works on cost or	
Factory expenses	
"B" works cost	
Add: Office and administrative	
Expenses	
"C" cost of production	
Add: Selling and Distribution	
expenses	
"D" Cost of sale	
Add: Profit or Less: loss	
"E" Selling price	

The presentation of total cost according to their variability is shown under.

Statement of total costs

Direct Material cost	
Direct wages	
Direct Expenses	
"A" prime cost	
Add: Variable expenses	
"B" Marginal cost	
Add: Fixed overhead	
"C" Total cost	

Fixed and variable costs: Fixed costs are those costs which remain constant at all levels of production within a given period of time. In other words, a cost that does not change in total but become, progressively smaller per unit when the volume of production increases is known as Fixed Cost. It is also called "Period Costs".

Variables costs are those costs which vary in accordance with the volume of output.

Absorption costing and Marginal Costing : Absorption costing is also termed as Traditional or Full Cost method. In this method, the cost of a product is determined after considering both fixed and variable costs. In absorption costing all costs are identified with the manufactured products.

Marginal costing is a technique where only the variable costs are considered while computing the cost of a product. The marginal cost of a product is in variable cost. In this method only variable costs are changed to the cost units. Fixed cost is written against contribution for that period.

Hence we can derive a formula for contribution as under:

Contribution = sale price - marginal cost

Standard costing : Standard costing is a specialised technique of costing. In this costing standard costs are pre-determined. Actual costs are compared with pre-determined costs. The variations between the two are noted and analysed. Measures are taken to control the factors leading to unfavourable variations. Standard costing serves as an effective tool in the hands of the management for planning, coordinating and controlling of various activities of the business.

Loans from financial institutions

Long-term and medium-term loans can be secured by companies from state financial institutions, commercial banks, state level Industrial Development Corporations, etc. Loans agreed to be sanctioned must be covered by securities by way of mortgage of the company's property or assignment of immovable assets etc.

Loans from commercial banks

Medium-term loans can be raised by companies from commercial banks against the security of properties and assets. Funds required for modernisation and renovation of assets can be borrowed from banks.

Loan procurement and banking process

Objectives: At the end of this lesson you shall be able to

- explain the short term and long capital needs
- describe the banking norms for processing loan application
- Iist to submit documental evidences towards the project.

Entrepreneurs after preparing the project and feasibility report, should spell out his loan requirements in two parts.

Entrepreneur should show some evidence of availability of land and building for the venture either owned or rented. If rented,he should produce lease agreement to the Banker along with his project.

The loan requirement should indicate the short term loan (Working capital) and long term loan (Fixed capital) separately, along with quotation of the machinery supposed to be procured.

Entrepreneur should produce a provisional SSI certificate optained from industries department.

Evidence of power availability, market potential from anticipated customers should be produced to the financing institution to reinforce the loan requirement.

Entrepreneur on demand should produce either a guarantor or willing to mortage property for the value of loan applied.

The entrepreneur should demonstrate the likely success of his project through acceptable debt equilty ratio of his project and also the break even production level.

Enterpreneur should strictly follow the terms and condition laid by the financing institution.

Micro units development and refinance agency (MUDRA)

Micro units development and refinance agency (MUDRA) is a public sector financial launched by Prime Minister on 8th April 2015.

The prime objective of this setting up as bank is to provide finance or refinace for lending upto 10 lakhs to micro enterprises under pradhan mantri MUDRA Yojana (PMMY) for employment creation and income generation in manufacturing services, Retail business, agricultural applied activities. The PMMY has the category of fundings:

1. Shishu- loan upto Rs 50,000/-

2. Kishor- Loan from Rs 50,000 and up to 5 lakhs

3. Tarun- Loan from 5 lakhs and up to 10 lakhs.

The objective of the scheme is for development and promotional support for the following.

Skill development

entrepreneurship development

Sectoral development

Instituitional development

Financial literacy

Micro loan under PMMY can be availed form nearby branch office of a bank. Borrowers can also file an line application for MUDRA loans an mudramitra portal (www.mudramitra.in). There are no agents or middleman engaged by MUDRA for availing MUDRA scheme. The borrowers are advised to keep away from those posing as agents of MUDRA.



Name of the Bank:



LOAN APPLICATION FORM PRADHAN MANTRI MUDRA YOJANA (To be submitted along with documents as per the check list)

A.For office Use:

Enterprise N	Application Sl No.			N	Name of Branch				Category				
									Shis	hu/Ki	shor/]	Farun	
B.Business Infor	matio	1:											
Name of the Enterprise													
Constitution		Proprietary Partnership			Pvt. I	Ltd.	Ltd	. Con	npany	An	y Oth	ers (Sp	becify)
Current Busine	200												
Address	200	State				PI	N Co	ode					
i iddi ebb		Business Premises]	Rente	ed	Owned			
Telephone No.		Мо		bile No	Э.	91							
E-mail:													
Rusinoss Astiv	ity,	Existing											
Business Activ	ity	Proposed											
Date of Comment	cement	(DD/MM/YY	YYY)										
Whether the Unit	is Reg	istered				Yes				No		-	
If Registered (Please mention: Registration no. And the Act under which registered)					·								
Registered Office Address													
Udyog Aadhaar Registered No.													
Social Category				SC		ST	OBC	M	inority	/ Com	munity		
If Minority Community		Buddhist	s Mu	slims	Chris	Christians		ikhs	Jains		Zoroastrians		ns

C.Background Information of Proprietor/ Partner/ Directors:

S. No	Name	Date of Birth	Sex	Residential Address with Mobile No.	Academic Qualification	Experience in the line of activity (if any
S. No	Id Proof	Id Proof No.	Address Proof	Address Proof No.	Pan Car/ DIN No.	Relationship with the officials/ Directors of the bank if any

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D. Name of Associate Concerns and Nature of Association:

Name of	Address of	Presently	Nature of	Extent of Interest as a
Associate	Associate	Banking with	Association	Prop./Partner/Director or Just
concern	Concern		Concern	Investor in Associate Concern

E. Banking/ Credit Facilities Existing: (In Rs.)

Type Of	Presently	Limit	Outstanding As	Security	Asset		
Facilities	Banking With	Availed	On	lodged	classification		
	_			-	status		
Savings Account		N.A.		N.A.			
Current Account		N.A.		N.A.			
Cash Credit							
Term Loan							
LC/BG							
If banking with this bank, customer ID to be given here:							

It is certified that our unit has not availed any loan from any other bank/ Financial institutional in the past and I/we am/are not indebted to any other Bank / Financial Institution other than those mentioned in column no. E above.

F. Credit Facilities Proposed :(In Rs.)

Type of Facilities	Amount	Purpose for which	Details of Primary Security Offered (with
		Required	approx. value to be mentioned)
Cash credit			
Term loan			
LC/BG			
Total			

G. In case of Working Capital: Basis of Cash Credit Limit applied: (In Rs.)

Actual Sa	les				Project	ed		
FY-	FY-	Sales	Working Cycle in Months	Inventory	Debtors	Creditors	Promoter's Contribution	Limits

H. In Case of Term loan requirements, the details of machinery/ equipment may be given as under:

Type of	Purpose for	Name of	Total Cost of	Contribution being	Loan Required
machine/	which required	Supplier	Machine	made by the	(Rs)
equipment				promoters (Rs.)	
		Total			

Repayment period with moratorium period requested for

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I. Past Performance / Future Estimates: (In Rs.)

Past Performance / Future Estimates (Actual performance for two previous years, estimates for current year and projections for next year to be provided for working capital facilities. However for term loan facilities projections to be provided till the proposed year of repayment of loan.)

1 5 1		J 1 J	,	
	Past Year - II	Past Year -II	Present Year	Next Year
	(Actual)	(Actual)	(Estimate)	(Projection)
Net Sales				
Net Profit				
Capital (Net				
Worth in case of				
Companies)				

J. Status Regarding Statutory Obligations:

Statutory Obligations	Whether	Remarks
	Complied with	(Any details in
	(select Yes/No)	connection with the
	if not applicable	relevant obligation to be
	then select N.A.	given.)
1. Registration under Shops and Establishment Act		
2. Registration under MSME (Provisional / Final)		
3. Drug License		
4. Latest Sales Tax Return Filed		
5. Latest Income Tax Returns Filed		
6. Any other Statutory dues remaining outstanding		

K. Declaration :

I/We hereby certify that all information furnished by me/us is true, correct and complete. I/We have no borrowing arrangements for the units except as indicated in the application form. There is/are no overdue/ statutory due owed by me/us. I/We shall furnish all other information that many be required by Bank in connection with my/our application. The information may also be exchanged by you with any agency you may deem fit. You, your representatives or Reserve Bank of India or Mudra Ltd., or any other agency as authorised by you, may at any time, inspect/ verify my/ our assets, books of accounts etc. in our factory/business premises as given above. You may take appropriate safeguards/action for recovery of bank's dues.

Space for Photo	Space for Photo	Space for Photo
(Signature of Pro	prietor/partner/director whose phot	o is affixed above)

Date : _	
Place:	

CHECK LIST :SHISHU

- 1. Prof of identity Self Certified copy of Voter's ID card / Driving License/ Pan Card/ Aadhaar Card/ Passport/ Photo Ids issued by Govt. authority etc.
- 2. Proof of Residence Recent telephone bill/electricity bill(not older than 2 months), latest property tax receipt, Voter's ID card, Aadhaar Card, Passport of individual/ Proprietor/ Partners, Certificate issued by Govt. Authority/ Local Panchayat/ Municipality etc.
- 3. Applicant's Recent Photograph (2 Copies) not older than 6 months.
- 4. Proof of SC/ST/OBC/Minority, if applicable.
- 5. Proof of identity / Address of the Business Enterprises if available.
- 6. Statement of Account from the existing Banker for the last six months, if any.
- 7. Quotation of Machinery / other items to be purchased.

CHECK LIST : KISHORE & TARUN

- Proof of identity Self certified copy of Voter's ID card / Driving License / PAN Card/ / Aadhaar Card/ Passport/ Photo Ids issued by Govt. authority etc.
- 2. Proof of Residence Recent telephone bill/electricity bill(not older than 2 months),latest property tax receipt, Voter's ID card, Aadhaar Card, Passport of individual/ Proprietor/ Partners, Certificate issued by Govt. Authority/ Local Panchayat/ Municipality etc.
- 3. Proof of SC/ST/OBC/Minority, if applicable.
- 4. Proof of Identity / Address for the Business Enterprise Copies of relevant Licenses/ Registration Certificates / Lease to Rent agreement/ Other Documents pertaining to the ownership, identity of address of business unit / Udyog Aadhaar Memorandum.
- 5. Statement of Accounts from the existing Banker for the last six months, if any.
- 6. Last two years unaudited balance sheet of the existing units along with income tax/ sales tax returns etc. (Applicable for loans of Rs. 2 lacs and above.)
- Projected balance sheets of the start -ups/ existing units for one year in case of working capital limits and for the period of the loan in case of term loan (Applicable for loans of Rs. 2 lacs and above.)
- 8. Sales achieved during the current financial year up to the date of submission of application (in case of existing units).
- 9. Performa invoices / Quotations for the assets to be purchased and estimates for the civil works, if any to be undertaken. Aspect of technical feasibility and economic viability may be discussed with borrower if felt necessary.
- 10. Asset & Liability statement of the borrower including Directors & Partners.
- 11. Memorandum and Articles of association of the company / Partnership Deed of Partners etc. wherever applicable.
- 12. Photos (two copies) of applicant/ Proprietor/ Partners/ Directors not older than 6 months.

Employability Skills - (NSQF) Entrepreneurship Skills : Theory 2.1.35

Employability Skills - Entrepreneurship Skills

Exercise 2.1.35

Filling up the preliminary project report proforma

Objectives: At the end of this exercise you shall be able to

- read the project report proforma carefully and collect the details required
- fill up each column in the proforma neatly, with relevant information
- verify the filled up project report and put your signature.

PROCEDURE

- 1 Read the project report proforma carefully.
- 2 Collect the details and enclosures required along with the report.
- 3 Fill up the project report proforma neatly (one by one column).

Avoid over writing while filling up the proforma It's better to fill up the photo copies of the proforma first.

- 4 Complete all the column in the proforma with relevant details.
- (A) Identification particulars/ Introduction:

- 5 Check the filled up columns once again and ensure that all the columns are filled up with required information.
- 6 Get the filled up project report checked by your instructor.
- 7 Put your signature without forgetting in the appropriate place.

Signature may be obtained from the promoter (or) authorised signatory.

Name of the proposed organization	
Location of the proposed unit and address	
Promoter(s) & Address	
Product(s) to be manufactured	
Annual production capacity and its value Quantity: Value:	
Total investment (Rs.) Own: Loan amount:	
Type of organization	Sole proprietorship/ Partnership/Co-operative Society / Others

(B) Details of the Promoter(s) /Entrepreneur:

- Name & Address for communication
- Date of birth & age
- Do you belong to SC/ST/OBC/Others (please specify)
- Educational qualification
- Special training, if any
- Work experience (past and present)

(Attach separate sheets for each promoter/ partner, if the proposed unit is promoted by more than one entrepreneur)

(C) Details of the proposed project:

SI.No.	Item/Product/Service activity	Total quantity / Year	Sales Revenue/year

(D) Market potential:

Estimate the demand and availability of the product

(A detailed market survey report is to be enclosed).

(E) Method of manufacture and technical details:

Production methods	Attach separate sheet incorporating a process flow-sheet, indicating sequence of operations.
Quality control / Standards	
Target production per annum Quantity: Value:	

(F) Fixed capital:

(F1) Land and building

Land (Area in square meters) ______ sq.m: Value - Rs.

Buildings (specify the size/dimensions, area) : Value - Rs.

(If the factory premise is proposed to be hired on rent, mention the details under the sub-head 'Other Expenses')

(F2) Machinery / Equipments:

S No.	Description	Nos. required	Price/unit	Total value (Rs.)	Name/address of suppliers	
		·		Total (A)		
Testing	Testing equipments					
Electricals, erection & commissioning charges @ 10% of machinery cost						
Moulds, dies and fixtures Furniture, Office equipments						
Total (B)						
Total (A+B)						

(F3) Non-refundable advances & deposits

(F4) Contingency expenses

Fixed capital:F= F1+F2+F3+F4 =

Employability Skills - (NSQF) Entrepreneurship Skills : Exercise 2.1.35

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(G) Working Capital

(G1) Raw materials(per month)

SI. No.	Item	Total Annual requirements		Names / Address of suppliers
		Quantity	Value	
			Total (Rs.)	

(G2) Utilities (per month)

SI. No.	Particulars	Annual requirement	Total Annual expenses	Remarks
1	Electricity			
2	Water			
3	Coal/Oil			
Total (Rs.)				

(G3) Man power requirements & wage details (per month)

SI No.	Particulars	Nos.	Salary / Month / employee	Total wages & Salaries (Rs.)

(G4) Other Expenses (per month)

Rent	
Administrative Expenses - Postage, Stationery etc.	
Sales Expenditures including advertising and Publicity	
Repairs and Maintenance	
Transport Expenses	
Taxes / Insurance	
Others	
Total	

Working Capital for 3 months G= (G1+G2+G3+G4)*3 = Rs.____

Employability Skills - (NSQF) Entrepreneurship Skills : Exercise 2.1.35

(H) Cost of the Project / Total Capital Investment (Rs.)

Fixed Capital	(F)	
Working Capital	(G)	
Pre-operative Expenses (Lumpsum)		
Total		

(I) Sources of Finance:

SI No.	Particulars	Value (Rs.)	Remarks
1	Term Loan		
2	Working Capital Loan		
3	Own Investment		
4	Subsidy		
5	Other sources, if any		

(J) Annual Sales:

Item/Product	Unit (MT/Kg/Ltr.)	Unit Price (Rs.)	Total (Rs.)

(K) Project Profitability Analysis:

SI.No.	Description	Value (Rs.)
K1	Sales Revenue	
K2	Manufacturing Expenses (Raw materials + Utilities + Salaries & Wages)	
K3	Selling & Distribution Expenses	
K4	Administrative Expenses	
K5	Interest	
K6	Depreciation	
K7	Gross profit K1 - (K2+K3+K4+K5+K6)	
K8	Income Tax	
K9	Net Profit (K7 - K8)	

(L) Key Ratios

1	Profitability ratio	
2	Return on investment	
3	Debt : Equity Ratio	
4	Debt Service Coverage Ratio	
5	Current Ratio	
6	Return on Equity	
7	Percentage of Break-Even	

(M) Supplementary details, if any

Date:

Place:

Signature of the promoter/ Authorised signatory

Employability Skills - (NSQF) Entrepreneurship Skills : Exercise 2.1.35

MODULE 2 PRODUCTIVITY

Theory 2.2.36

Productivity

Objectives: At the end of this lesson you shall be able to

- state the meaning of productivity with examples
- describe the necessity for productivity
- state the meaning of GDP (Gross Domestic Product).

Definition

Productivity may be defined as ratio of output to input.

This definition applies in an enterprise, an industry or an economy as a whole.

Productivity is nothing more than arithmetical ratio between the amount produced and the amount any resources used in the course of production. These resources may be: **Land materials, Plant, Machines & Tools,** the Services of Men, or, as it is generally the case, a combination of all four.

Examples of each type

Productivity of land : If by using better seed, better methods of cultivation & more fertilizer the yield of corn from a particular acre of land can be increased from 2 quintals to 3 quintals, the productivity of LAND in the agricultural sense, has been increased by 50 percent.

Productivity of materials : If a skilful tailor is able to cut 2 suits from a metre of cloth from which an unskilful tailor can cut only one, in the hands of the skilful tailor the cloth was used with greater productivity.

Productivity of machines : If a machine tool has been producing 100 pieces per working day and through the use of improved cutting tools its output in the same time is increased to 120 pieces, the productivity of that machine has been increased by 20 percent.

Productivity of men : If a potter has been producing 30 plates an hour and improved methods of work enable him to produce 40 plates an hour, the productivity of that man has increased by 33.3 percent.

In each of these three deliberately simple examples of output a production has also increased and in each case by exactly the same percent as the productivity but an increase in production doesn't by itself indicate an increase in productivity. If the input of resources goes up in direct proportion to the increase in output, the productivity will stay the same.

In short, higher productivity means that more is produced with the same expenditure of resources, i.e., at the same cost in terms of land, materials, machine, time or labour, or alternately that the same amount is produced at less cost in terms of land, materials, machine time or labour used up, thus releasing some of these resources for the production of other things.

Necessity of productivity

Each Nation or Community must, in the long run, be self supporting. The standard of living achieved will be that which the representative citizen is able to achieve through his own efforts and those of all his fellow citizens.

The greater the amount of goods and services produced in any community, the higher its average standard of living will be.

There are two main ways of increasing the amount of goods and services produced. One is to increase employment; the other is to increase productivity.

GDP (Gross Domestic Product)

GDP is the monetary value of all the finished goods and services produced within a country's borders in a specific time period, though GDP is usually calculated on an annual basis. It includes all of private and public consumption, government outlays, investments and exports less imports that occur within a defined territory.

GDP = C + G + I + NX

Where:

- "C" \rightarrow All private consumption, or consumer spending, in a nation's economy
- "G" \rightarrow sum of government spending
- "I" \rightarrow sum of the country's businesses spending on capital

"NX" is the nation's total net exports, calculated as total exports minus total imports. (NX = Exports - Imports)

There is a scientific way of measuring prosperity that, while not fully descriptive, is useful in comparing the standard of living across countries. This is called the GDP per capita measure. This is simply calculated by dividing the nominal GDP in a common currency; say US dollars, by the total number of people in the country. This gives the average amount of income that each member of the population potentially has access to. In other words, the more money each individual is able to access the higher the potential standard of living.

This is a useful means of comparing economic wellbeingthat is, prosperity - across countries. For instance, the GDP per capita in the US is around \$25,000 while in Mexico it is around \$7000. It stands to reason that by and large, the standard of living in the US is higher than the standard of living in Mexico. This same logic can be used to compare the standard of living between any countries. As mentioned earlier, the GDP per capita measure is the nominal GDP divided by the population. Thus, for a given amount of output, a country with a smaller population will have a higher standard of living than a country with a larger population. This is a problem often encountered in countries with very low GDP per capita measures of the standard of living. When GDP grows slowly and the population increases rapidly, the GDP per capita and thus the standard of living tends to decline over time. Thus, a major way of increasing the standard of living in a country is to control the population growth rate and thus increase the GDP per capita.

Employability Skills - (NSQF) Productivity : Theory 2.2.36

Employability Skills - Productivity

Incentive, production linked bonus and improvement in living standard

Objectives: At the end of this lesson you shall be able to

- state the definition, purpose & impact of incentives
- state what is incentive, its purpose and impact
- list out the steps involved in designing incentive scheme
- state the meaning of production linked bonus
- describe how living standards are improved with increase in productivity
- describe how the productivity improves industry and nation.

If in any community there are men and women who are able to work and if the output of goods and services can be increased to the extent of the capacity that is provided for them, we can have:

- More and cheaper food by increasing the productivity of agriculture
- More and cheaper clothing & shelter by increasing the productivity of industry
- More security and essential services by increasing all productivity and earning power, leaving more from which to pay for them.

Personnel/Workman Incentive

Incentives are the measures to stimulate human effort; people are encouraged to give out their best by inducing them on to greater and more productive efforts.

Positive incentive rewards extende to the employee, for superior performance and they can be classified as

- 1) Non Financial
- 2) Semi-Financial
- 3) Financial

Financial incentive :

Which are also known as Wage incentives, it is one form of motivation, and one of the technique of increasing productivity. It is providing additional wage to the minimum wage for the additional work depending upon the relative worth which is determined by the job evaluation.

Purpose of Incentives :

The main purpose of the incentive is to motivate the worker to give his best; incentives try to improve the efficiency of workers by making them work more effectively with less wastage of time, at a greater pace with better application to the job without detriment to his health. Usually the objective of any incentive scheme is to increases output consistent with certain quality standards, the objective of incentive is

- 1 Higher output.
- 2 Improved quality

- 3 Reduced waste,
- 4 Higher plant utilization,
- 5 Lower cost of production,
- 6 Higher earnings for worker

To achieve maximum results from incentives, the production processes and methods should be first improved and standardized, methods should be simplified delays and interruptions should be minimized through the application of method study techniques before an incentive is introduced.

Impact of incentive on productivity :

The National Productivity council carried out a research project on "Incentive in Industries". The project highlight indicates both production and productivity went up after the introduction of incentive schemes.

Steps involved in designing incentives scheme

The basic steps involved in designing an incentive scheme are

- 1 Selecting the objective of the incentive scheme and determining the factors that facilitate quantitative measurement of the objective
- 2 Measuring and developing performance standards for the selected factors
- 3 Determining performance Reward relationship
- 4 Determine payment period
- 5 Reviewing the scheme
- 6 Installation and maintenance of the scheme

Production linked bonus

Production process can be represented by production or transformation function at various levels of the economy. Production function relates maximum producible output to sets of available inputs.

Producers behave efficiently i.e. they minimize costs and or maximize revenues, labour productivity is a useful measure, it relates to the single most important factor of production.

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Theory 2.2.37

P R O D U C T I V I T Y

Labour remains the single most important input to many production processes. Labour input is most appropriately measured as the total number of hours worked.

With the hours worked as the quantity measure of labour services, average compensation per hour will be its price component. Average hourly compensation corresponds to the wage rate from a producer's point of view, provided it includes all supplements to wages and salaries.

The straight piece work system compensates the workers directly in proportion to the output. The worker gets paid at a specified rate per unit of output.

Ex.:	Rate per piece		:	Rs. 1000
	Total number of pie	ces produced	:	100
	Example	100 X 10 =	:	1000

A standard time is set up for completing a job or a unit of work which is usually based on past production records. The worker gets the guaranteed wages if he completes the job in the allowed time or more than the allowed time. If the job is completed in less than the standard time, in addition to his wages, amount or financial benefit is rewarded at his time rate for a definite percentage of the time saved.

Ex:	Standard time	:	8 hours	
Wor	kers hourly rate	:	Rs 10	

Actual time taken to complete the job : 6 hours total

Earnings : (6 hours X Rs 10) + (1 hour X Rs. 10) For 50 % of the time saved under 50:50

Sharing : Rs. 7 for 6 hours work

One way of calculating bonus is named as ROWAN SYSTEM: In this system also, a standard time is allowed for a job, and a bonus is paid if the job is completed in less than the standard time. The time saved is calculated as percentage of the standard time, and the same percentage of the workers rate is credited as bonus for the time saved,

Ex: Workers hourly rate	:	Rs 10
Standard time for the job	:	8 hours
Actual time taken for the job	:	6 hours
Time saved	:	2 hours
Time saved as a percentage of St	andar	d: 25 %

. 20 /0 011(3. 10
Rs. 2.5
ours X (Rs. 10 X 0.25)
Rs. 15

Improvement in living standard

The standard of living is a measure of material welfare.

In the previous section we learned that increase in productivity allow a given amount of labour to produce a greater amount of output that was possible before the productivity increase. Popular wisdom dictates that increase in productivity thus reduce the number of jobs available, because less labour is required to produce the same amount of output. Fortunately, this is not the case suggested by the historical economic data. Rather, increased productivity seems to help the economy overall to a much greater extent than it hurts workers, especially in the long run.

A historical example will serve to demonstrate this. Since the early 20th century, there has been an over 1000% increase in output per hour in the Japan. This means that, on average, workers today can produce more than 10 times more than what workers, on average, could produce around the turn of the century. With productivity increases this high, it seems that unemployment should be very high, too, as all of the goods and services used in the early 1900's can be produced now by a much smaller workforce.

But, as productivity increases, so do the number of products and markets available. Similarly, as products become less expensive, due to more efficient production methods, the quantity demanded for some of those products also increases. Overall, in the long run, increases in productivity are offset by increases in demand, so those jobs are not lost.

This is how increases in productivity do not necessarily result in a rise in unemployment. But what is the other side of this coin? That is, what are the effects of lagging productivity? In general, a country that lags in productivity will have both lower wages and lower living standards than a country with higher productivity.

This assumption is based on the idea that all economies trade on the open market. If a country that lags in productivity produces a good to sell on the international market, it must price the good at the same level that more productive countries. In this case, the only way for the lagging country to produce the good at a low price is to pay labour a low wage. Thus, if labour receives a low wage, the workers are unable to provide or enjoy a high standard of living.

Let's work this out through an example. Say that there is an international market for widgets. The going price is \$5 per widget. Most productive countries are able to produce widgets and sell them for this price. One country, which is lagging in productivity, can only produce widgets at half the speed of the other countries. But, because the lagging country is only able to sell widgets at \$5 each, it must reduce its costs of production. Since labour is the only cost that can be changed, as the machines are paid for and their maintenance cannot be put off, workers are paid less to make the country that lags in productivity competitive in the international marketplace.

Employability Skills - (NSQF) Productivity : Theory 2.2.37

Productivity is the main determinant of living standards, it quantifies how an economy uses thee resources it has available, by relating the quantity of inputs to outputs.

Productivity improves Prosperity

What does a high standard of living entail? This judgement is relatively subjective, but there are a number of factors that seems to be common to most economists' ideals. These include physical possessions, nutrition, health care, and life expectancy. The more prosperous an economy, the better off the citizens of that economy are in terms of material possessions and health. Thus, prosperity is attainable when wages are high and countries are highly productive.

For most of us, standard of living is a know-it-when-Isee-it concept. We might not be able to express it in precise terms, but we think we know it when we see it. Ask us to define it, and we'll reel off a list of things we associate with living well: a nice car, a pleasant place to live, clothes, furniture, appliances, food, vacations, maybe even education. Ask us to measure it, and we'll probably look at whether or not we're "doing better" than our parents. Yet there is a generally accepted measure for standard of living: average real gross domestic product (GDP) per capita. Let's break it down piece by piece: Changes in the quality of life -Standard of living means of having clean air, clean water, more leisure time, and increased life expectancy;

The productivity benefits from education reforms typically materialize in the longer term, but they are fundamental for enhancing living standards, improvements in educational quality and attainment would be critical to support long term growth prospectus.

Industry

Introduction Research development efforts across all industries are driven by the goal of improving the productivity of industrial processes Improvements can income a variety of ways, including lower capital costs and operating costs, increased yields, and reductions in resource and energy use. Any industrial technology development will incorporate one or more of these improvements. Some innovations may primarily be aimed at one goal, but also generally include beneficial impacts on other impacts of a production process. Energy efficient technologies often include these "additional" benefits" Certain technologies that are identified being "energyefficient" because they reduce the use of energy will bring a additional enhancements to production process" These improvements are collectively referred to as "productivity benefits" because addition to reducing energy,

Benefit Category	Example	Comments
Production improvement	Increased yield of product, shorter processing cycles, improved quality	Because these are direct impacts on production, their impact can be directly quantified relative to output and production costs.
Operating and Maintenance savings	Lower operation and maintenance costs reduced wear & tear on equipment, increased reliability.	Easily measured as changes in operation and maintenance expenses, reduced replacement of equipment or components.
Working environment	Safer conditions, reduced noise, improved lighting, improved air quality, improved temperature control.	Less tangible and affect production indirectly
Waste reduction	Reduced wastage of product, water and hazardous materials, and reduced raw material use, effective reutilization of waste heat.	Could be evaluated as lower expenditure on raw materials, and energy on the handling and treatment of waste.
Emission reduction	Reduced emissions of dust and other pollutants. Cost saving from avoidable litigation.	These benefit will be directly measurable for pollution where emission controls or permit exists.

Categories of productivity benefit

Nation

Productivity growth can raise incomes and reduce poverty in a virtuous circle. Productivity growth reduces production costs and increases returns on investments, some of which turn into income for business owners and investors and some of which are turned into higher wages. Prices may go down, consumption and employment grow.

The virtuous circle is also fed through the investment side of the economy when some productivity gains are reinvested by a firm into product and process innovations, plant and equipment improvements and measures to expand into new markets, which spurs further output growth and productivity. In the long term, productivity is the main determinant of income growth. Productivity gains increase real income in the economy, which can be distributed through higher wages. A low-wage, low-skill development strategy is unsustainable in the long term and incompatible with poverty reduction. Investment in education and skills helps to "pivot" an economy towards higher value added activities and dynamic growth sectors.

Higher productivity can be attained through adequate levels of earnings, higher job security, higher education and life-long training including on-the job training; good working conditions - a safe and healthy working environment, an appropriate balance between work intensity and job autonomy and greater employee participation and empowerment, including social dialogue; and better work-life and gender balance. These can strengthen human capital formation, including firmspecific human capital, and increase motivation, commitment and effort. They can reduce accidents, absenteeism and stress, induce creative effort, foster cooperation and generate positive externalities on coworkers".

Employability Skills - (NSQF) Productivity : Theory 2.2.37

Skill, working aids, automation and environmental impact

Objectives: At the end of this lesson you shall be able to

- list the factors affecting productivity
- define working aids
- state how automation improves productivity
- state how environment and motivation play important role in improving productivity.

Skills

Skill Development is one of the critically important drivers of productivity growth and competitiveness at the organizational level. Agreements between employers and workers are important means of promoting workplace learning and of ensuring that increased productivity by benefiting both employers and workers.

Skill development is important in combating poverty and exclusion as it is for maintaining competitiveness and employability.

The process of skill development for productivity, employment and growth and development is complex and is influenced by policies and institutions.

Objectives: Countries have different initial economic and social conditions, and however data shows that all countries that have succeeded in linking skills with productivity, employment growth and development have targeted skills development policy towards three objectives:

1 Meet skills demand in terms of relevance and quality: Skill policies need to develop relevant skills, promote lifelong learning, deliver high levels of competencies and a sufficient quantity of skilled workers to match skill supply with demand furthermore equal opportunities in access to education, and work is needed to meet the demands for training across all sectors of society, policies designed to meet skills demand contribute to productivity, employability and decent work because Enterprise can use technologies efficiently and fully exploit productivity potential. Young people acquire employable skills which facilitates their transition for school to work and smooth integration into the labour market.

Workers build up and improve competences, and develop their career in a process of lifelong learning.

Disadvantaged population groups have access to education, training and the labour market.

2 Coordination between skill development and enterprises is required to match skill supply and demand. : Labour market intermediaries identify, skill needs and communicate this information to schools, training institutions and apprentice systems to create the required skill. Institutions that provide credible assessment and certification of workers, Skill help enterprise more easily to recognize workers with skill and match them with their demand.

3 Coordination of skills development policies with Industrial Investment, Trade technology and Macroeconomic policies is needed to effectively integrate skills development policies into the national development strategy and to achieve policy coherence. Building skills competencies and capabilities in society is a long term process. A forward looking skills development strategy is therefore needed to ensure that the timely supply of skills required in future markets.

Working aids

In order to increase productivity, each worker must be able to produce more output. This is referred to as labour productivity growth. The only way for this to occur is through an in increase in the capital utilized in the production process. This increase can be in the form of either human capital or physical capital.

An example will help to illustrate the basic way that labour productivity growth works through increases in the capital stock. Say there is a riveter named Joe. Joe works in a factory that makes metal boxes that are riveted together. He has a riveting tool that can rivet at a rate that allows Joe to finish 4 metal boxes every hour. Joe's labour productivity is thus 4 boxes per hour. One day, Joe gets a second riveting tool. With two tools, Joe can produce 8 metal boxes every hour. Now Joe's labour productivity has increased from 4 boxes per hour to 8 boxes per hour. The increase in the physical capital available to Joe, that is, a second tool, allowed this increase in Joe's labour productivity. For every hour of work Joe puts in, he can produce 100% more output due to an increase in the physical capital available to him.

Another example may also be of use. Say there is a chef named Susan. Susan can cook 10 hamburgers in an hour. One day, she decides to go to the Hamburger Cooking School to learn how to cook hamburgers faster. When she returns to work, she is able to cook 40 hamburgers per hour by utilizing the new tricks she learned. By attending the cooking school, Susan increased her human capital and thus increased her labour productivity.

It is important to remember that increases in capital can take the form of both quantity and quality increases. From these two examples, it is clear that the only way to achieve labour productivity growth is to increase the amount of capital, physical and/or human, available to workers. And in the long run, the only way for overall productivity to increase is though increases in the capital used in production.

Ρ

Automation

Automation or automatic control is the use of various control systems for operating equipment such as machinery, processes in factories, boilers and heat treating ovens, switching in telephone networks, steering and stabilization of ships, aircraft and other applications with minimal or reduced human intervention. Some processes have been completely automated.

The biggest benefit of automation is that it saves labour, however, it is also used to save energy and materials and to improve quality, accuracy and precision.

Automation has been achieved by various means including mechanical, hydraulic, pneumatic, electrical, electronic and computers, usually in combination. Complicated systems, such as modern factories, airplanes and ships typically use all these combined techniques.

Advantages & Disadvantages

The main advantages of automation are:

- Increased throughput or productivity.
- Improved quality or increased predictability of quality.
- Improved robustness (consistency), of processes or product.
- Increased consistency of output.
- · Reduced direct human labour costs and expenses.
- The following methods are often employed to improve productivity, quality, or robustness.
- · Install automation in operations to reduce cycle time.
- Install automation where a high degree of accuracy is required.
- Replacing human operators in tasks that involve hard physical or monotonous work.
- Replacing humans in tasks done in dangerous environments (i.e. fire, space, volcanoes, nuclear facilities, underwater, etc.)
- Performing tasks that are beyond human capabilities of size, weight, speed, endurance, etc.
- Economic improvement: Automation may improve in economy of enterprises, society or most of humanity. For example, when an enterprise invests in automation, technology recovers its investment; or when a state or country increases its income due to automation like Germany or Japan in the 20th Century.
- Reduces operation time and work handling time significantly.
- Frees up workers to take on other roles.
- Provides higher level jobs in the development, deployment, maintenance and running of the automated processes.

The main disadvantages of automation are:

- Security Threats/Vulnerability : An automated system may have a limited level of intelligence, and is therefore more susceptible to committing errors outside of its immediate scope of knowledge (e.g., it is typically unable to apply the rules of simple logic to general propositions).
- Unpredictable/excessive development costs : The research and development cost of automating a process may exceed the cost saved by the automation itself.
- **High initial cost**: The automation of a new product or plant typically requires a very large initial investment in comparison with the unit cost of the product, although the cost of automation may be spread among many products and over time.

Environmental Impact

What is resource productivity? Resource productivity refers to the effectiveness with which an economy uses materials extracted from natural resources (physical inputs) to generate economic value (monetary outputs). The Operation for Economic Co-operation and Development Controversy (OECD) puts "resource productivity" in a welfare perspective, including a qualitative dimension (e.g. the environmental impacts per unit of output produced with a given natural resource input). Decoupling is breaking the link between "environmental bads" and "economic goods". Absolute decoupling occurs when environmental degradation is decreasing while the economy is growing. Decoupling is relative when environmental degradation is growing, but at a slower rate than the economy.

Workplace wellness emerged during the 1990s as a major concern for employers, especially in the developed countries, marking an evolution away from the traditional occupational health and safety focus on injury and disease prevention. Programs designed to promote employee health and well-being is now found in an estimated 80 to 90 percent of medium and large size, workplaces. The motivation for most employers is to bring down or contain the rising cost of health benefits, with the alternative being cut backs in benefits coverage. Some firms also view these programs as contributing to a culture that is supportive of employees. Less often, the main objective is to boost productivity. The rapid diffusion in the U.S. of workplace wellness programs designed to promote individual employees' health reflects the fact that many employers in that country have to pay a significant share of employees' health care costs. Still, other countries are also developing such programs. Similar programs are still rare in Asia, however, with Singapore being an exception.

Motivation

Motivation is an emotional fact which means needs and wants of the have to be tackled by forming an incentive plan.

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Motivated employees are inclined to be more productive than not motivated employees. Most business makes some pains to motivate workers, but this is normally easier said than done. Employees are all individuals with different likes, dislikes and needs, different things will motivate each.

Let us understand the term Motivation:

Motivation: Motivation is the word derived from the word "Motive" which means needs, desire, wants or drives within the persons; it is the process of inspiring people actions to achieve the goals.

In the work, goal achievement depends on the psychological factors motivating the people's behaviour can be :

- Job Satisfaction
- Achievement
- Team work
- · Need for money

Respect

One of the most important functions of management is to create enthusiasm amongst the employees is to execute in the best of their abilities, therefore the role of a leader is to arouse interesting presentation of employees in their jobs. The process of motivation consists of three stages:

- 1 Oblige
- 2 An incentive by which needs have to be aroused.
- 3 When needs are satisfied, the satisfaction or achievement of goals.

Productivity how improves or slow down

Productivity is the cornerstone of economic growth. We are richer than our grandparents and than the average person in the third world primarily because we are more productive. Productivity also affects our competitive position the more productive we are the better we are able to compete on world markets. In short, productivity is the source of the high standard of living enjoyed by the developed economies relative to the third world or to the same economies fifty or one hundred years ago.

Improvement/Slow down of productivity

Another factor underlying productivity growth is invention and innovation narrowly defined--roughly speaking, the men and women in the white lab coats. One way to raise the productivity is to spend money on research and development. The United States of America, on the whole, is the world leader in pure science and thus, you would think, the leader in development of new technologies. The trick here is to take basic scientific advances and convert them into profitable ventures. By all reports the United States is not as good at the second step as it is at the first, while for the Japanese it's the reverse. This is overly simplistic, of course.

One of the troubling trends in the US in recent years has been a decline among US firms in R&D expenditures, patent applications, and other technology indicators. If this trend continues, some fear that there can be adverse long term effects on the US productivity growth.

- 1 Growth in output comes from increases in factor inputs and growth in productivity. A major reason why Japan has grown more rapidly than the United States over the last thirty years has been their larger rate of investment in physical capital.
- 2 Productivity is related to investment in education, research and development, management techniques, and simple experience.
- 3 There are a number of examples of societies that were technologically sound but not economically advanced. Evidently technology is not enough, you also need a social/political/cultural/legal environment that fosters its application.
- 4 A variety of national policies are likely to lead to higher productivity: Education, transportation and communication infrastructure, basic and applied research, and clearly defined property rights, are the areas in which National Policies should be evolved.

Employability Skills - Productivity

Comparitive productivity in developed countries

Objectives: At the end of this lesson you shall be able to

- compare the productivity in developed countries
- state the living standards of the developed countries.

Comparison with developed countries

A country has a comparative advantage in producing a good of the opportunity cost of producing that good, is lower in their country than it is from another country.

A country with a comparative advantage in producing a good uses its resources most efficiently when it produces those goods compared to producing other goods.

Labour is the important resources for production. Because workers expect high wages, they will work in the industry that pays a higher hourly wage.

Gains from trade come from specializing in production that uses resources most efficiently, without the technology. A country has to allocate resources to produce all of the goods that it wants to consume. With the technology, a country can specialize its production and trade (convert) the products for the goods that it wants to consume.

Evidence shows that low wages are associated with low productivity. Other evidence shows that wage rise as productivity rises. In 2000 South Korea labour productivity was 35% of United States and its average wage were about 38% of the United States average wages. After the Korean War, South Korea was one of the poorest

countries in the world, and its labour productivity was very low. In 1975 Average wage in South Korea was still only 5 % of the United States average wage.

Goods will be produced wherever it is cheaper to produce them.

High productivity gives countries a cost advantage that allows them to produce efficiently. When a country has a comparative advantage in a certain industry it can expand this industry while simultaneously increasing labour productivity.

Productivity in developed countries.

Primary source of data is the United Nations Industrial Development Organization. (UNIDO) and Industrial Statistic Data base.

Table considers the level of total factor productivity (TFP) by country and industry. India TFP is of the order of 10% of the United States of America.

Total Factor Productivity (TFP) relative to the United States (USA=100) (Table 1)

	Factors				
Country	Manufacturing	Steel	Mining	Construction	Food
Australia	65	61	68	63	46
Germany	75	87	86	79	55
Japan	121	98		100	87
India	6	6	12	10	8

Labour Forces (United States: 100) (Table 2)

		Fac	ctors		
Country	Manufacturing	Steel	Mining	Construction	Food
Australia	102	79	123	140	77
Germany	90	114	79	98	95
Japan	70	98		75	66
India	286	215	820	435	175

P R O D U C T I V I T Y

Living standards of those countries, wages

According to the United Nations Human development index, the United states of America is always in the top twenty, Higher productivity will lead to increase in GDP per capita, Life expectancy, Political stability, Better Family life, Community life, Gender equality and job security.

The home ownership rate is relatively high, the country has a high access to consumer goods, and they enjoy more cars, radios & televisions per capita than any other nation. The developed countries like America, Australia, Germany, Japan etc have 64 % own their own living quarters, 55% had at least two TV sets, 51% had more than one vehicle. 98 % of all households a telephone service. 77% a washing machine.

All these countries standard of living is regarded as the highest amongst all the countries in the world.

Effective	1st July 2014	1st April 2013	1 st January 2015	1st January 2014
Percent of GDP per capita	49.4%	50.3%	41.1%	53.7%
Hourly PPP (Int\$)	10.96	10.33	2.61	10.85
Hourly (US\$)	17.39	11.69	2.3	12.22
Work week (hours)	38	8° S	44	نى
Annual PPP (Int\$)	21,654	20,408	5,980	19,740
Annual (US\$ ⁾	34,358	23,104	5.253	22,237
Minimum Wage	Most workers are covered by an award, which may vary by employee age, geographical location and industry. For adults not covered by an award or agreement, the minimum wages is A\$16.87 per hour, A\$640.90 per week; set federally by Fair Work Australia. Junior workers, apprentices and trainees not covered by an award each have a minimum wage level set nationally.	€1,501.82 (\$1,925) per month, €9.12 (\$11.69) per hour for workers 21 years of age and over; €1,541.67 (\$1,977) per month for workers 21 and a half years of age, with six months of service; €1,559.38 (\$1,999) per month for workers 22 years of age, with 12 months of service; coupled with extensive social benefits.	R\$788.06 (US\$292,52) ¹ per month, paid 13 times a year. The Brazilian minimum wage is adjusted annually by the federal government. Each Brazilian state has its own minimum wage, which cannot be lower than the federal minimum wage.	€1,445.38 per month, €9.53 per hour.
Minimum Wages Country	Australia	Belgium	Brazil	France

List of minimum wages of various countries

Employability Skills - (NSQF) Productivity : Theory 2.2.39

Minimum Wages Country	Minimum Wage	Annual (US\$)	Annual PPP (Int\$)	Work week (hours)	Hourly (US\$)	Hourly PPP (Int\$)	Percent of GDP per capita	Effective
Germany	€8.50 per hour. A higher minimum wage is often set by collective bargaining agreements and enforceable by law.	22,950	21,442	40.5	10.9	10.18	50.2%	1st January 2015
India	Varied from 118 rupees (\$2.18) per day in Bihar to 185 rupees (\$3.40) per day in Haryana (with local cost of living allowance included). State governments set a separate minimum wage for agricultural workers. The minimum wages are set according to Minimum Wages Act, 1948.	689	2,296	48	0.28	0.92	44.7%	2012
Indonesia	Established by provincial and district authorities, which vary by province, district, and sector; the lowest minimum wage was in the province of Central Java at rupiah 910,000 per month and the highest was in Jakarta at rupiah 2,441,301 per month.	1,163	2,612	40	0.56	1.26	29%	1ª January 2014
l ^r an	The minimum wage was raised to 609,000 Iranian tomans (\$187) (equal to 6,090,000 rials) effective on the 2014 Persian New year; set annually for each industrial sector and region. The standard workweek is 44 hours, and any work over 48 entitles the worker to overtime.	6,002	11,711	44	2.62	5. 12	74.4%	21 st March 2014
Japan	Ranges from 664 Japanese yen to 888 yen per hour; set on a prefectural and industry basis.	17,648	12,426	40	8.48	5.97	34.9%	1st Ocotber 2014

Minimum Wages Country	Minimum Wage	Annual (US\$)	Annual PPP (Int\$)	Work week (hours)	Hourly (US\$)	Hourly PPP (Int\$)	Percent of GDP per capita	Effective
South Korea	5,580 South Korean wonper hour; reviewed annually,	10,303	12,689	40	4.95	6.1	42.3%	1⁴ January 2015
Netherlands	€1,495.20 per month, €345.05 per week, €69.01 per day, and €8.63 per hour for persons 23 and older; between 30-85% of this amount for persons aged 15-22.	23,003	20,506	40	11.06	9.86	47.3%	1ª July 2014
New Zealand	NZ\$14.25 per hour for workers 18 years old or older, and NZ\$11.40 per hour for those aged 16 or 17 or in training; there is no statutory minimum wage for employees who are under 16 years old.	24,098	18,838	40	11.59	9.06	57.2%	1ª April 2014
Philippines	205 pesos per day in nonplantation agricultural sector in the llocos Region to 466 pesos per day in the nonagricultural sector in the National Capital Region.	1,515	3,353	40	0.73	1.61	54.9%	25 th July 2014
Poland	1,680 PLN (€405) per month. Real full cost (if a worker is not a student etc.) for employer (from which are taken different social, health etc. funds for that worker) is: 2028,43 PLN, and netto for worker, after cuts for health services, accidents fund, work fund, retirement etc. is 1237,20 PLN. With 40 hours week and 4 weeks in month it give about 12.67 PLN/per hour brutto (or after cuts netto ~7.73 PLN/hour).	6,184	10,449	4	2.97	5.02	45.9%	1⁵ January 2014

Employability Skills - (NSQF) Productivity : Theory 2.2.39

iimum Wages untry	Minimum Wage	Annual (US\$)	Annual PPP (Int\$)	Work week (hours)	Hourly (US\$)	Hourly PPP (Int\$)	Percent of GDP per capita	Effective
ssia	5,554 rubles per month.	2,161	3,841	40	1.04	1.85	16.3%	1₅t January 2014
Dain	€752.85 per month in 12 payments, €645.30 per month in 14 payments.	11,582	11,539	40	5.57	5.55	35.9%	1st January 2013
iwan	The minimum wage in Taiwan is NT\$19,273 per month; NT\$115 per hour.	8,481	16,001	42	3.88	7.33	41.3%	1st January 2014
d Kingdom	£6.50 per hour (aged 21+), £5.13 per hour (aged 18-20), £3.79 per hour (under 18), £2.73 per hour (apprentices aged 16 to 18 and those aged 19 or over who are in their first year).	20,495	16,810	38.2	10.32	8.46	47.1%	1st October 2014
<pre>cd States</pre>	The federal minimum wage in the United States is US\$7.25 per hour. States may also set a minimum, in which case the higher of the two is controlling; some territories are exempt and have lower rates.							

Employability Skills - (NSQF) Productivity : Theory 2.2.39

Employability Skills - Productivity

Banking process, KYC Registration, Cash handling, Personal risk and Insurance

Objectives: At the end of this lesson you shall be able to

- explain the banking process
- explain how to handle ATM
- state the techniques of safe cash handling
- state what is KYC (Know Your Customer) in bank
- state the meaning of personnel risk and insurance.

Banking process

A bank is a financial intermediary and money creator that create money by lending money to a borrower, thereby creating a corresponding deposit on the bank's balance sheet. Lending activities can be performed directly by loaning or indirectly through capital markets. Due to their importance in the financial system and influence on national economies, banks are highly regulated in most countries.

Banks act as payment agents by conducting checking or current accounts for customers, paying cheques drawn by customers on the bank, and collecting cheques deposited to customers' current accounts. Banks also enable customer payments via other payment methods such as Automated Clearing House (ACH), Wire transfers or telegraphic transfer,EFTPOS, and Automated Teller Machine (ATM). Banks borrow money by accepting funds deposited on current accounts, by accepting term deposits, and by issuing debt securities such as banknotes and bonds. Banks lend money by making advances to customers on current accounts, by making installment loans, and by investing in marketable debt securities and other forms of money lending.

To translate the activities with the bank, individual or jointly account has to be opened.

By opening an account one also agree to be bound by the terms, conditions, policies and rules governing the account as set forth in this manual, in the Account Opening Form, or otherwise applied by the Bank, at its discretion. Accounts will be opened after verifying identity and signature.

The bank needs following documents for opening the account

Documents for identification and Address for Consumers

Proof of Identity	Proof of address	
Voter ID	Voter I D	
Driving Licence	Driving Licence	
Pass port	Pass port	
Govt ID with photo	Govt ID with photo	
	Current 3 Months Elec Telephone / Water sup	tricity/ ply bill

At least two current documents should be submitted,

Categories of consumer accounts

Individual Accounts : These are opened in the name of one person who authorizes all transactions. Joint accounts shall be opened with right of survivorship only These are opened when two or more persons desire to have a common or joint account. These can be operated: Jointly by all the persons with right of survivorship only by any one of them;

In the event of death of anyone of the joint account holders, the balance will be available to the surviving account holder(s).

All account holders must sign the application and specimen signature card.

The Bank reserves the right to freeze or suspend the account if It receives a letter from any one of the account holders objecting to further transactions, or It is made aware of a dispute.

In such an eventuality, all account holders will have to sign any instruction to the Bank. The Bank shall have the right to set off all funds in the account against any overdue debt, or to satisfy a judgment against the account holder or any one of the account holders in the case of joint account holders.

Handling ATM

An Automated Teller Machine or Automatic Teller Machine (ATM), is an electronic telecommunications device that enables the customers of a financial institution to perform financial transactions without the need for a human cashier, clerk or bank teller.

Ρ

On most modern ATMs, the customer is identified by inserting a plastic ATM card with a magnetic stripe or a plastic smart card with a chip that contains a unique card number and some security information such as an expiration date or Card Verification Value code (CVVC) or Card Verification Value (CVV). Authentication is provided by the customer entering a Personal Identification Number (PIN).

Using an ATM, customers can access their bank deposit or credit accounts in order to make a variety of transactions such as cash withdrawals, check balances, or credit mobile phones. If the currency being withdrawn from the ATM is different from that in which the bank account is denominated the money will be converted at an official exchange rate. Thus, ATMs often provide the best possible exchange rates for foreign travelers, and are widely used for this purpose.

ATMs are placed not only near or inside the premises of banks, but also in locations such as shopping centers/ malls, airports, grocery stores, petrol/gas stations, restaurants, or anywhere frequented by large numbers of people. There are two types of ATM installations: onand off-premises. On-premises ATMs are typically more advanced, multi-function machines that complement a bank branch's capabilities, and are thus more expensive. Off-premises machines are deployed by financial institutions and Independent Sales Organizations (ISOs) where there is a simple need for cash, so they are generally cheaper single function devices.

Many ATMs have a sign above them, indicating the name of the bank or organization owning the ATM and possibly including the list of ATM networks to which that machine is connected.

ATMs can also be found in train stations and metro stations. In recent times, countries like India and some countries in Africa are installing ATM's in rural areas as well, which are solar powered. These ATM's also do not require air conditioning.

Safe cash handling procedures

Proposed Standards/ Guidelines for Cash Logistics organisations in India Following are the proposed standards that the cash logistics companies should follow:

- 1 **Premises Location :** The area should be closer to withdrawal centres; police stations; or areas with good connectivity in order to ensure security. The premises should be sufficiently sized to include
- 2 Physically independent areas :
 - "Cash processing/handling zone: This zone should accommodate space for cash deposit, collection, sorting, counting and delivery/dispatch of cash on secured vehicles.
 - "Cash Vault: A secure area to store cash. The area should be as per RBI C class vault norms. Security: The premises should have all the basic security facilities like:
 - 24x7 electronic CCTV (Closed Circuit Television) surveillance and monitoring by armed guards.

- Cash processing and vault areas should have restricted and controlled access, preferably through interlocking systems and frisking. Vault operations should always be under dual custody.
- Main vault area should adhere to all safety norms like fire fighting systems, smoke detection systems, emergency lighting, control room for monitoring the movement of vehicles, auto-dealer, hotline connections to the nearest police station and burglar ?

Office space : Proper workspace for the staff of the branch should be made available to attend the day to day work.

The scope of these procedures includes but is not limited responsibilities of departments and cash handlers citywide. The procedures provide guidelines for training, cash receipt handling, receipting, depositing, reporting and hiring practices.

Access to cash handling and storage areas should be physically restricted to authorized personnel. Where possible, cash deposit preparation areas should be both physically and visually restricted to authorized personnel.

When not in use, all cash and related items must be stored in a fire-proof safe that is located in a secure area. Safes must be kept locked at all times except when access by authorized personnel is needed. Never leave an unlocked safe unattended, even during business hours.

KYC Registration

KYC (Know Your Customer): It is imperative that while opening accounts, the authorized officer must be satisfied about the proper identity, standing and residential proof of the prospective customer, it is only after furnishing of proper identity through photo identifies card and acceptable address proof that accounts are to be opened.

Personnel risk and insurance

Risk management which includes insurance coverage is intended to minimize the costs associated with assuming certain types of risk and providing prudent protection. It deals with pure risk that are characterized by chance occurrence and that may only result in a financial loss.

Pure risk can be separated into three major categories: a) Property b) Liability c) Personnel

Property risk : It also includes indirect expenses that result from property loss

Liability risk : It includes loss resulting from injury or death of both employees and the public loss alleging official misconduct

Personnel risk : It concerns those risk associated with the loss of key personnel.

There are three stages in risk management, risk identification & analysis, risk control and risk treatment.

Once the decision is made to insure a particular risk, a knowledgeable professional insurance agent can assist in the selection of an underwriter; the financial capacity of the insurance company should be analysed to determine that the company has the ability to make payment should a significant loss occur.

Employability Skills - (NSQF) Productivity : Theory 2.2.40

Sample of the KYC form

Λ polyoption Lowpoint Low Induviduolo ()plu			DP ID N	No. :
NEW CHANGE REQUEST (Please tick / the appropriate)			Applica	ation No. :
Please fill in ENGLISH and in BLOCK LETTERS with	black ink			
A. Identity Details (please see guidelines overling) Name of Applicant (As appearing in supporting identification	eat)			
Name Name Name Name Name Name Name Name				PHOTOGRAPH
Father's/Spouse Name				
2. Gender 🗌 Male 📄 Female B. Marital status 🗔 Si	ngle Married C. Date of Birth	d d / m m	/ y y y y	Please affix
3. Nationality Indian Other (Please specify)				size photograph and
4. Status Please tick (\checkmark) \square Resident Individual \square Non Resident	dent 🗌 Foreign National (Passport C	opy Mandatory for NRIs	& Foreign Nationals)	sign across it
5. PAN Please e	nclose a duly attested copy of your PA	N Card		
Unique Identification Number (UID)/Aadhaar, if any:				
6. Proof of Identity submitted for PAN exempt cases Ple	ase Tick (✓)			
UID (Aadhaar) Passport Voter D Driving	Licence U Others		(P	lease see guideline 'D' ov
B. Address Details (please see guidelines overla	eaf)			
City / Town / Village			Pin Code	
State	Co	intry		
2. Contact Details				
Tel. (Off.) (ISD) (STD) Mobile (ISD) (STD)	lei.	Fax (ISD) (STD)		
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Other types of Insurance: The following are brief descriptions of some of those types of insurance:

Automobile : Public liability and property damage: Protects against property and liability loss arising from injury from the vehicle

Boiler and Machinery : Provides coverage for loss due to explosion or other forms of destruction of boilers, heating and or cooling systems and similar types of equipment.

Fire : Covers all losses attributed to fire, including damage from smoke or water and chemicals used to extinguish the fire.

General Liability : Covers the bank from possible losses arising from a variety of occurrence and typically general liability insurance provides coverage against specified hazards, such as personnel injury medical payment, comprehensive general liability insurance covers all risks, except specific exclusions.

Record Keeping: Following records should be maintained:

- ٠ Coverage provided detailing major exclusions
- Insurance Agency •
- The deductible amount .
- The upper limit
- The term of the policy •
- The due date of premium
- The premium amount

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Employability Skills - (NSQF) Productivity : Theory 2.2.40
MODULE 3

OCCUPATIONAL SAFETY, HEALTH (OSH) & ENVIRONMENT EDUCATION

Introduction to Occupational Safety and Health (OSH)

Objectives: At the end of this lesson you shall be able to

- define occupational safety and health
- state the importance of safety and health at workplace
- state the role of employer, trade union & employee for health & safety program.

Occupational Safety and Health (OSH) is an area concerned with protecting the safety, health and welfare of people engaged, co-workers, family members, employees, customers, and many others who might be affected by the workspace environment.

Workspace safety: Owner/Occupier of industries have to comply with legal directions to take care for the safety, health and welfare of their employees. Equally the workers have moral responsibilities to follow all safety norms and healthy on the shop-floor. (Fig 1)



Occupational health : Health at work is also called occupational health. It is concerned with enabling an individual to undertake their day to day work fully knowing the health hazards they are exposed to and preventing them at the workspace.

Good safety and health practices can also reduce employee injury and illness related costs, including medical care, sick leave and disability benefit costs. (Fig 2)



The joint ILO/WHO committee on occupational health (1995) main focus in occupational health is on three different objectives :

- (i) The maintenance and promotion of workers' health and working capacity.
- (ii) The improvement of working environment and the work to become conducive to safety and health.
- (iii) Development of work organization and working cultures in a direction which supports health and safety at work and in doing so also promotes a positive social climate and smooth operation and may enhance productivity of the undertakings.

Employment and working conditions in the formal or informal economy embrace other important determinants, including working hours, salary, workspace policies concerning maternity leave, health promotion and protection provisions etc.

The health of the workers has several determinants, including risk factors at the workspace leading to accidents, musculoskeletal diseases, respiratory diseases, hearing loss, circulatory diseases, stress related disorders and communicable diseases and others.

Creating safe and healthy working conditions is a challenge to all industries, as the new technologies and new patterns of work are fast growing. The challenges, changes resulting in new risks and disorders in many. When safety and health measures are not followed accidents, injuries, diseases and even deaths may occur.

Victims of workspace injuries and occupational diseases have to be compensated properly. Preventive actions at workspace are needed so that similar cases can be avoided. The industries and the working population and their families including the dependent population will benefit from the good practice of occupational safety and health.

Safety problems in work settings, ranges from immediate threats like toxic substances and grievous bodily injuries to subtle progressive dangers such as repetitive motion injuries, high noise levels, and air quality. In general, workplace hazards can be categorized into three groups:

- 1 Chemical hazards, in which the body absorbs toxins.
- 2 Ergonomic hazards, in which the body is strained or injured, often over an extended period, because of the nature (design) of the task, its frequency, or intensity.

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- OSH & ENVIRONMENT EDUCATIO
- **3 Physical hazards,** in which the worker is exposed to harmful elements or physical dangers, such as heat or moving parts.

In the modern context, corporate management increasingly has viewed industrial safety measures as an investment - one that may save money in the long run by way of reducing disability pay, improving productivity and avoiding lawsuits.

Prevention is better than cure :

No place of work can always be completely safe all the time and whilst some work places present greater risks than others. Industry nowhere is immune to the possibility of an accident. Hence all industries should develop the ability to carry out risk assessment processes and to take all precautionary steps to ensure the safety of the workforce. It is a group collective effort that includes each and every member of the workforce. Employers should always ensure that they implement the following.

- Provide adequate control of the health and safety risks.
- Consult with employees on matters affecting their health and safety.
- · Provide and maintain safe plant and equipment.
- Ensure safe handling and use of substances.
- Provide information, instruction, supervision and training so that employees are competent to carry out their role, on safety.
- · Review and revise all these policies regularly.

Health and Safety programmes

For all of the reasons (Fig 3), it is crucial that employers, workers and unions are committed to health and safety, addressing the following areas.



- Workplace hazards are controlled at the source whenever possible;
- Records of any exposure are maintained for many years.

- Both workers and employers are informed about health and safety risks in the workplace.
- Establish an active and effective health and safety committee that includes both workers and management.
- To observe that the workers' health and safety efforts are ongoing.

Effective workplace health and safety programmes can help to save the lives of workers by reducing hazards and their consequences. Health and safety programmes also have positive effects on both worker morale and productivity, which are important benefits. At the same time, effective programmes can save employers a great deal of money.

Healthy workplace, hazard free work environment, zero accident work-life can help to save the lives of workers by reducing hazards and diseases. Effective programmes can also have positive effects on both worker morale and productivity. All put together enhances the human values at work and prosperity of the nation.

- 1 Occupational health and safety encompasses the social, mental and physical well-being of workers in all occupations.
- 2 Poor working conditions have the potential to affect a worker's health and safety.
- 3 Unhealthy or unsafe working conditions can be found anywhere, whether the workplace is indoor or outdoor.
- 4 Poor working conditions can affect the environment workers live in. This means that workers, their families, other people in the community, and the physical environment around the workplace, can all be at risk from exposure to workplace hazards.
- 5 Employers have a moral and often legal responsibility to protect workers.
- 6 Work-related accidents and diseases are common in all parts of the world and often have many direct and indirect negative consequences for workers and their families. A single accident or illness can mean enormous financial loss to both worker and employers.
- 7 Effective workplace health and safety programmes can help to save the lives of workers by reducing hazards and their consequences.
- 8 Effective programmes can also have positive effects on both worker morale and productivity, and can save employers a great deal of money.

Employability Skills - OSH & Environment Education : Theory 2.3.41

Employability Skills - OSH & Environment Education

Theory 2.3.42

OSH & ENVIRONMENT EDUCATIO:

Basic hazard, Chemical hazard and Mechanical hazards

Objectives: At the end of this lesson you shall be able to

- explain various occupational hazard
- state occupational hygiene
- describe occupational disease disorders and its prevention.

All jobs, primarily provides many economic and other benefits, But equally there are a wide varieties of workplace dangers and hazards, which are risky to the health and safety of people at work.

Basic hazards :

Employers have a responsibility to protect workers against health and safety hazards at work. Workers have the right to know about potential hazards and to refuse work that they believe is dangerous. Workers also have a responsibility to work safely with hazardous materials. Health and Safety hazards exist in every workplace. Some are easily identified and corrected, while others create extremely dangerous situations that could be a threat to your life or long-term health. The best way to protect oneself is to learn to recognize and prevent hazards in the workplaces.

Physical hazards are the most common hazards and are present in most workplace at some point of time. Examples include; live electrical cords, unguarded machinery, exposed moving parts, constant load noise, vibrations, working from ladders, scaffolding or heights, spills, tripping hazards. Physical hazards are a common source of injuries in many industries. Noise and vibration, Electricity, Heat, Ventilation, Illumination, Pressure, Radiation etc.

• Ventilation and air circulation have major say on the health and working comfort of the worker. There must be good ventilation, a supply of fresh, clean air drawn from outside is required. It must be uncontaminated and circulated around the workspace. Closed of confined spaces also present a work hazard, which has limited openings for entry and exit and unfavorable natural ventilation, and which is not intended for continuous employee occupancy.

Spaces of this kind can include storage tanks, ship compartments, sewers, and pipelines. Asphyxiation is another potential work hazard in certain situations. Confined spaces can pose a hazard not just to workers, but also to people who try to rescue them.

Noise and Vibration : Noise and vibration are both fluctuations in the pressure of air (or other media) which affect the human body. Vibrations that are detected by the human ear are classified as sound. We use the term 'noise to indicate unwanted sound. Noise and vibration can harm workers when they occur at high levels, or continue for a long time. (Fig 1)



- Electricity poses a danger to many workers. Electrical injuries caused by contact with electric energy can be divided into four types
 - fatal electrocution,
 - electric shock,
 - burns,
 - falls .



Wires and electrical equipment pose safety threats in the workspace. When employees mishandle electrical equipment and wires, they are taking risks. (Fig 2)

- **Temperature (Heat Stress) :** A reasonable working temperature, for strenuous work, local heating or cooling where a comfortable temperature is to be maintained which is safe and does not give off dangerous or offensive fumes, Thermal clothing and rest facilities where necessary (for example, for 'hot work' or work in cold storage areas). Sufficient space in workrooms etc. are under the legislation for implementation by the owner of the factories.
- **Illumination (lighting) :** Good light lighting is essential for productivity Natural light is preferred wherever possible. Glare and flickering should be avoided.

HEAT EXHAUSTION/HEAT STROKE & TREATMENT

- NORMAL BODY CORE TEMPERATURE 37[°]C
- HEAT EXHAUSTION 38°C 40°C
- HEAT STROKE 41°C AND HIGHER

SIGNS AND SYMPTOMS

HEAT EXHAUSTION	HEAT STROKE
• RESTLESS	REDUCED LEVEL OF CONCIOUSNESS
• WEAK	• IRRITABLE
• DIZZY	MUSCULAR PAIN
RAPID PULSE	RAPID PULSE
LOW BLOOD PRESSURE	HIGH BLOOD PRESSURE
• NAUSEA	• NAUSEA
• VOMITTING	• VOMITTING
MENTAL STATUS - NORMAL	MENTAL STATUS - CONFUSED
BEHAVIOUR - NORMAL	BEHAVIOUR - ERRATIC
	HOT, DAY, RED SKIN
	• DEATH
TREATMENT	
LAY PERSON DOWN & ELEVATE LEGS	MOVE PERSON TO COOL VENTILATED AREA
	• CHECK FOR BREATHING DUI SE &

ENSURE NORMAL BREATHING	CHECK FOR BREATHING, PULSE & CIRCULATION
IF THIRSTY GIVE WATER TO DRINK	IF POSSIBLE COVER THE PERSON WITH ICE PACKS OR COLD WATER TO REDUCE THE BODY TEMPERATURE
REPORT INCIDENT TO SUPERVISOR	GIVE WATER TO DRINK
	MONITOR VITAL SIGNS
	GET PERSON TO HOSPITAL
	REPORT INCIDENT TO SUPERVISO

Chemical hazards are present when you are exposed to any chemical preparation (solid, liquid or gas) in the workplace. Examples include: cleaning products and solvents, vapours and fumes, carbon monoxide or other gases, gasoline or other flammable materials. Chemicals hazards are the major causes of concern. Many chemicals are used not on generic names but on brands. The chemicals have biological effects on the human body if digested, inhaled or if direct skin contact with the chemicals, injuries occurs.

Accidents involving chemical spills, exposure and inhalation can lead to burns, blindness, rashes and other ailments. Most of them cause acute poisoning when taken orally, eye-skin irritation, Respiratory injuries etc. Long term effects of chemicals on blood, nerve, bones, kidneys, livers etc., my lead to serious diseases/disorders. The only way is to understand their chemical nature and handle them very carefully.

CHEMICAL POISONING

Poison : An agent or substances which may cause structural damage or functional disorders when introduced into the body by :

- Ingestion
- Inhalation
- Absorption or
- Injection

Biological hazards (Fig 3) come for working with people, animals or infectious plant material. Examples include; blood or other bodily fluids, bacteria and viruses, insect bites, animal and bird droppings. Biological hazards are due agent like bacteria, virus, fungi, mold, blood-borne pathogens etc., are main agents to cause various illness. (Fig 4)



BIOLOGICAL STRESS AGENTS

insects

Moulds Viruses

Fungi Bacteria

BIOLOGICAL HAZARD

OSH & EZV-ROZEEZT EDUCAT-OZ

Ergonomic hazards (Fig 5)

Ergonomic hazards occur when the type of work you do, your body position and/or your working conditions put a strain on your body. They are difficult to identify because you don't immediately recognize the harm they are doing to your health. Examples include : poor lighting, improperly adjusted workstations and chairs, frequent lifting, repetitive or awkward movements. Musculo Skeletal Disorders (MSDs) affect the muscles, nerves and tendons. Work related MSDs are one of the leading causes injury and illness.



Workers in many different industries and occupations can be exposed to risk factors at work, such as lifting heavy items, bending, reaching overhead, pushing and pulling heavy loads, working in awkward body postures and performing the same or similar tasks repetitively. Exposure to these known risk factors for MSDs increases a worker's risk of injury.

Vibro acoustic hazard

Protection of employees against hazard caused by noise and mechanical vibration in the working environment. Suitable action has to be taken to control this hazard by developing to measure and evaluate health effects due to noise, infra-and ultra sound of mechanical vibration, limiting emission at source. Suitable PPE should be worn by the workers.

Mechanical hazards are factor arise out of varieties of machines in industries including manufacturing, mining, construction and agriculture. They are dangerous to the worker when operated without training and experience. Operating machines can be risky business, especially large, dangerous machines. When employees don't know how to properly use machinery or equipment, they risk such injuries as broken bones, amputated limbs and crushed fingers. Many machines involve moving parts, sharp edges, hot surfaces and other hazards with the potential to crush, burn, cut, shear, stab or otherwise strike or wound workers if used unsafely.

Various safety measures exists to minimize these hazards, lockout-tagout procedures for machine maintenance and roll over protection systems for vehicles. Machines are also often involved indirectly in worker deaths and injuries, such as in cases in which a worker slips and falls, possibly upon a sharp or pointed object. Safeguarding machinery decreases accidents and keeps employees who use the machine safer.



Electrical hazards

Electricution are one of the greatest hazards mainly due to improper grounding, damaged insulation, exposed electrical component, over load circuit, wet condition, damaged tool, over head power lines etc.,

Thermal hazards

This is due to thermal stress including heat and cold. the condition arises when the temperature become too extreme for the body to handle. The body temperature will decrease due to cold stress causing potentially life threatening condition called hyper thermia. Workers oprating boiler, furnaces, foundry castings, heat treatment process are subjected to thermal hazards.



Falls (Fig 6) are a common cause of occupational injuries and fatalities, especially in construction, extraction, transportation, healthcare, and building cleaning and maintenance. Slips and falls to be the leading cause of workplace injuries and fatalities. From slippery surfaces to un-railed staircases, the possibility of slipping, tripping or falling on the job is a workplace safety hazard. Broken bones, fractures, sprained wrists and twisted ankles constitute some of the physical injuries caused by falling accidents.

Falls in the workplace is effectively prevented by putting caution signs around slippery surfaces (Fig 7), having rails on every staircase and making sure that wires on the floor are covered to avoid tripping. They are perhaps

Employability Skills - OSH & Environment Education : Theory 2.3.42

unavoidable in certain industries, such as construction and mining, but over time people have developed safety methods and procedures to manage the risks of physical danger in the workplace. Employment of children may pose special problems.

Psychosocial hazards : psychosocial hazards are related to the way work is designed, organized and managed, as well as the economic and social contexts of work and are associated with psychiatric, psychological and/or physical injury or illness. Linked to psychosocial risks are issues such as occupational stress and workplace violence which are becoming a major challenge to occupational health and safety.

Workplace inspections prevent hazards

Regular workplace inspections are another important factor in preventing injuries and illnesses. By critically examining all aspects of the workplace, inspections identify and record hazards that must be addressed and corrected.



A workplace inspection should include

- · Listening to the concerns of workers and supervisors.
- Gaining further understanding of jobs and tasks.
- Identifying existing and potential hazards.
- · Determining underlying causes of hazards.



 Monitoring hazard controls (Personal protective equipment, engineering controls, policies, procedures) • Recommending corrective action.

Occupational hygiene

Occupational hygiene (Industrial hygiene) (Fig 8) is the discipline of anticipating, recognizing, evaluating and controlling health hazards in the working environment with the objective of protecting worker health and well-being and safeguarding the community at large.

Occupational hygiene uses science and engineering to prevent ill health caused by the environment in which people work. It helps employers and employees to understand the risks and improve working conditions and working practices. (Fig 9)

Occupational disease/Disorders & its prevention

Occupational disease, illness incurred because of the conditions or environment of employment. Unlike with accidents, some time usually elapses between exposure to the cause and development of symptoms. In some instances, symptoms may not become evident for many years and hence the relationship between work and disease is ignored.

Among the environmental causes of occupational disease are subjected to extreme temperature leading to heatstroke, air contaminants of dust, gas, fumes causing diseases of the respiratory tract, skin, or muscles and joints or changes in atmospheric pressure causing decompression sickness, excessive noise causing hearing loss, exposure to infrared or ultraviolet radiation or to radioactive substances. The widespread use of X rays, radium and materials essential to the production of nuclear power has led to an special awareness of the dangers of radiation sickness. Hence careful checking of equipment and the proper protection of all personnel are now mandatory.

In addition there are industries in which metal dusts, chemical substances, and unusual exposure to infective substances constitute occupational hazards. The most common of the dust and fiber inspired disorders are the lung diseases caused by silica, beryllium, bauxite and iron ore to which miners, granite workers and many others are exposed causing pneumoconiosis and those caused by asbestos is cancer - mesothelioma, Fumes, Smoke and Toxic liquids from a great number of chemicals are other occupational dangers. Carbon monoxide, Carbon tetrachloride, Chlorine, Creosote, Cyanides, Dinitrobenzene, Mercury, Lead Phosphorus and nitrous chloride are but a few of the substances that on entering through the skin, respiratory tract or digestive tract cause serious and often fatal illness.

Occupational hazards also are presented by infective sources. Persons who come into contact with infected animals in a living or deceased state are in danger of acquiring such diseases as anthrax. Doctors, Nurses and other hospital personnel are prime targets for the tuberculosis bacillus and for many other infectious organisms.

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Theory 2.3.43

Accident & safety, awareness and use of Personal Protective Equipment

Objectives: At the end of this lesson you shall be able to

- state the basic principle for protective equipment
- state the accident prevention technique
- describe the controls of accidents & safety measures.

Basic Principles for Protective Equipment (PPE) :

Personal protective equipment, commonly referred to as "PPE", is a equipment worn to minimize exposure to serious workplace injuries and illnesses. (Fig 1) These injuries and illnesses may result from contact with chemical, radiological, physical, electrical, mechanical or







other workplace hazards. Personal protective equipment may include items such as gloves, safety glasses and shoes, earplugs or muffs, hard hats, respirators or coveralls, vests and full body suits. (Fig 2 & Fig 3)

Use of personal protective equipment : All personal protective equipment should be of safe design and construction, and should be maintained in a clean and reliable fashion. It should fit well and be comfortable to wear, encouraging the worker to use. If the personal protective equipment does not fit properly, it can make the difference between being safely covered or dangerously exposed. In engineering, work practice and administrative controls are not feasible or do not provide sufficient protection, employers must provide personal protective equipment to their workers and ensure its proper use. Employers are also required to train each worker about the use of right personal protective equipment:

- When PPE is necessary?
- What kind of PPE is necessary?
- How to properly put it on, adjust, wear and take if off.
- · The limitations of the equipment
- Proper care, maintenance, useful life and disposal of the equipment.

If PPE is to be used, a PPE program should be implemented. This program should address the hazards present; the selection, maintenance and use of PPE; the training of employees and monitoring of the program to ensure its ongoing effectiveness.

Accident prevention techniques-control of accidents and safety measures

Accident are unplanned, undesired event, not necessarily resulting in an injury or illness, but damaging property and/or interrupting the production activity in the process. Accident happen at all jobs. There are certain accidents that are common to a job. All employees should be trained and reminded how to do their job correctly to prevent unnecessary injuries while at work. An accident can occur when a machine malfunction or a person isn't paying attention to the work, they are supposed to do. Even a small accident can cause major problems for an employee and their employer. The best practice to avoid all types of accidents is to teach and promote a safe and happy workplace. (Fig 4)



Accidents can happen anytime at any place they are more likely to happen when a person is participating in an unsafe act. That is why it is important to follow all safety rules and guidelines while working. By taking a few more minutes to do the job safely then it is worth saving your life.

Over exertion in the workplace is a serious issue. Preventing damage to your back, knees and arms is very important. Train all employees on how to prevent over exertion by following safety rules and guidelines while completing workplace task.

Control of accidents are effected by reducing exposure to a hazards through engineering, work practices, administration or protective equipment.

Responsibilities

At department level the supervisors are made to instruct their employees regarding the requirements of this program, effectively enforce compliance of this program's procedures, including the use of disciplinary action, for any violations or deviations from the procedures outlined in this program; assure that the equipment required for compliance with this program is in proper working order, inspected and tested as required, and made available for use to their employees, promptly investigate and report all on-the-job accidents or job related health problems. (Fig 5)



Recognizing and controlling hazards

Engineering controls minimize employee exposure by either reducing or removing the hazard at the source or

isolating the worker from the hazard. Engineering controls include eliminating toxic chemical and substituting nontoxic chemicals, enclosing work processes or confining work operations, and the installation of general and local ventilation systems. Work practice controls alter the manner in which a task is performed. Some fundamental and easily implemented work practice, controls include changing existing work practices to follow proper procedures that minimize exposures. While operating production and control equipment, inspecting and maintaining process and control equipment on a regular basis, implementing good housekeeping procedures, providing good supervision and mandating that eating, drinking, smoking, chewing tobacco or gum, and applying cosmetics in regulated areas be prohibited and by providing a separate area exclusively for those, if needed.

Administrative controls, include controlling employees' exposure by scheduling production and tasks, or both, in ways the minimize exposure levels. (Fig 6) For example, the employer might schedule operations with the highest exposure potential during periods when the fewest employees are present. When effective work practices or engineering controls are not feasible or while such controls are being instituted, appropriate personal protective equipment must be used. Examples of personal protective equipment are gloves, safety goggles, helmets, safety shoes, protective clothing and respirators. To be effective, personal protective equipment must be individually selected, properly fitted and periodically refitted, consciously and properly worn, regularly maintained and replaced, as necessary.



The employees have to comply with the procedures of this program, consult with their supervisor, when they have questions regarding the safety and health conditions of their workplace, report any accidents or job related injuries or illnesses to their supervisor and seek prompt medical treatment, if necessary.

Employees are responsible for exercising appropriate care and good judgment in preventing injuries and illnesses, adhering to all safety and health rules, policies and procedures and reporting all unsafe conditions, malfunctioning or unsafe equipment, work related accidents, injuries and illnesses, and unsafe work practices to their immediate supervisor. If that is not feasible, a report should be made to the head of their department, the plant operations safety officer, or a member of the work safe/be well committee.

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Employability Skills - OSH & Environment Education : Theory 2.3.43

Employability Skills - OSH & Environment Education

Fire safety

Objectives: At the end of this lesson you shall be able to

- state different type of fire
- state the different types of fire extinguishers and their basic function.

Fire safety : Fire is the most common serious hazard that one faces in a typical chemistry laboratory. While proper procedure and training can minimize the chances of an accidental fire, you must still be prepared to deal with a fire emergency should it occur.

Typically, a fire extinguisher consists of a hand-held cylindrical pressure vessel containing fire fighting agent which can be discharged to extinguish a fire.

There are two main types of fire extinguishers :

- Stored pressure
- · Cartridge-operated.

In stored pressure units, the expellant is stored in the same chamber as the firefighting agent itself. Depending on the agent used, different propellants are used. With dry chemical extinguishers, nitrogen is typically used, water and foam extinguishers typically use air. Stored pressure fire extinguishers are the most common type. **Carbon-dioxide extinguishers** contain the expellant gas in a separate cartridge that is punctured prior to discharge, exposing the propellant to the extinguishing agent. This type is not as common, used primarily in areas such as industrial facilities, where they receive higher-than-average use. They have the advantage of simple and prompt recharge, allowing an operator to discharge the extinguisher, recharge it and return to the fire in a reasonable amount of time. Unlike stored pressure types, these extinguishers use compressed carbon dioxide instead of nitrogen, although nitrogen cartridges are used on low temperature (-60 rated) models.

Cartridge operated extinguishers are available in dry chemical and dry powder and in water, wetting agent, foam, dry chemical (classes ABC and B.C.) and dry powder (class D) types in the rest of the world.

A : Green Triangle	Ordinary solid combustibles	A for "Ash"
B : Red Square	Flammable liquids and gases	B for "Barrel"
C : Blue Circle	Energized electrical equipment	C for "Current"
D : Yellow Decagon (Star)	Combustible metals	D for "Dynamite"
K : Black Hexagon	Oils and fats	K for "kitchen"

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Class A : This is suitable for cloth, wood, rubber, paper, various plastics, and regular combustible fires. It is usually filled with $2\frac{1}{2}$ gallons (9.46 litres) of pressurized water.

Class A fire extinguishers are designed to put out fires that have started from household items that are made out of materials that will quickly ignite. These materials include paper products and furniture made from wood. The Type A fire extinguisher contains water. The number on the canister represents how much water it contains. If there is a No. 1, the extinguisher will have a little more than I gallon of water. The higher the number, the more water it contains. The letter A stands for ash. A fire that burns from household items will leave ashes.

Class B: This is suitable for grease, gasoline or oilbased fire is usually filled with a dry chemical. Extinguishers smaller than 6lbs (2.72kg) are not recommended.

Class B fire extinguishers are used to put out fires that have started from highly flammable liquids. These liquids include any type of lacquer or oil-based paint products, paint thinners and lacquer thinners, oils and gasoline. According to the phoenix fire department, the letter B represents a barrel. Most of these chemicals are transported in a barrel-like container. The number on the extinguisher represents how many square feet it will cover. A 3 would represent 3 square feet, which is not a very large area. A larger fire could not be extinguished with this extinguisher.

Class C: This is suitable for electrical fires caused by appliances, tools and other plugged in gear. It can contain either halon or CO_2 . Halon expensive and depletes the ozone layer and its use is restricted.

Class C : fire extinguishers are used to put out fires that have started from an electrical source. The source could be from appliances, lighting or your electrical system. This extinguisher uses carbon dioxide to put out the fire. Carbon dioxide will basically remove the oxygen from the air around the fire. Carbon dioxide is also used in some Type B extinguishers.

Class D: This is used for water-reactive metals such as burning magnesium and will be located in factories using such metals. It comes in the form of a powder that must cover the material to extinguish it.

Class D : Class D extinguishers are used to put out fires on metals that are capable of burning. These types of metals are found in the manufacturing industry only. This extinguisher uses a dry powder to put out the fire. You will not likely ever have a need for this type of extinguisher unless you work with titanium, sodium or magnesium.

Class K: This contains a special purpose wet chemical agent for use in kitchen fires and deep fryers to stop fires started by vegetable oils, animal fats, or other fats started in cooking appliances.

Class K : Many people have not heard of the Type K fire extinguisher. This extinguisher can be found in large kitchens. Many restaurants use large deep fryers full of cooking oils to deep fry foods. The typical Type B extinguisher would not be sufficient to put out a grease fire of this magnitude.

Fire fighting methods

Starvation/Blanketing	- Elimination of fuel
Smothering	- Limitation of oxygen
Cooling	- Removal of temperature

Employability Skills - OSH & Environment Education

Theory 2.3.45

First Aid Care and Transportation of Injured Person

Objectives: At the end of this lesson you shall be able to

- explain how to take care of injured & sick persons at workplaces
- explain how to provide first aid & transportation to sick person
- state ABC of first aid
- state how to report an emergency.

Purpose of First Aid

- To sustain life
- To prevent suffering
- To prevent secondary complications
- To promote speedy recovery
- To prepare for further medical treatment.

Each separate work site or shop should have a fully stocked first aid kit available for injuries or emergencies. First aid kits will be regularly inspected to insure they are adequately stocked with consumables and equipment. All first aid kits should conform to the most recent guidelines for first aid kits.

For temporary work sites, first aid kits may be stored in gang boxes, on vehicles, or other similar locations, as long as easy access for all workers at the temporary site is maintained, each worker knows where the first aid kit is located, and the kit is maintained in accordance with.

In situations where workers are injured beyond the need for general first aid, medical treatment will be provided in accordance with the plant workplace health and medical treatment program. At anytime a potential life threating injury has been incurred, workers will contact local emergency response services immediately, by the quickest means available.

Workers receiving medical treatment or surveillance examinations may be supplied with copies of the written opinions of the examining physicians as required by regulation, or recommended by the physician. Medical records for employees must be kept strictly confidential with access restricted to information directly related to work activities. Generally, medical records will be kept in the control of the examining physician/staff of the firstaid centre.

In emergency situations, such as fires, criminal, terrorist or civil disturbances, situations involving spills of, releases of, or exposure to hazardous materials (e.g. Chemical, Biological, Radiological), situations of severe weather, such as storms, tornadoes, blizzards, etc., or the loss of utility services, such as electricity, water, heat etc., workers should take appropriate actions to safeguard their lives, the lives of building occupants, and if possible the property of the university. Workers are to contact the appropriate agency as outlined. **First aid** is defined as the immediate care and support given to an acutely injured or ill person, primarily to save life, prevent further deterioration or injury, plan to shift the victims to safer places, provide best possible comfort and finally help them to reach the medical centre/hospital through all available means. It is an immediate life-saving procedure using all resources available within reach.

Imparting knowledge and skill through institutional teaching at younger age group in schools, colleges, entry point at industry level is now given much importance. Inculcating such habits at early age, helps to build good healthcare habits among people.

ASSESSING THE SICK OR INJURED PRIMARY SURVEY

• Is an initial rapid assessment of a casualty to establish and treat conditions that are an immediate threat to life.

DANGER RESPONSE AIRWAY BREATHING

CIRCULATION



First-aid procedure often consists of a range of simple and basic life saving techniques that an individual performs with proper training and knowledge.

The key aims of first aid can be summarized in three key points :

• **Preserve life**: If the patient was breathing, a first aider would normally place them in the recovery position, with the patient leant over on their side, which also has the effect of clearing the tongue from the pharynx. It also avoids a common cause of death in unconscious patients, which is choking on regurgitated stomach contents. The airway can also become blocked through a foreign object becoming lodged in the pharynx or larynx, commonly called choking. The first aider will be taught to deal with this through a combination of 'back slaps' and 'abdominal thrusts'. Once the airway has been opened, the first aider would assess to see if the patient is breathing.

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Prevent further harm : also sometimes called prevent the condition from worsening, or danger of further injury, this covers both external factors, such as moving a patient away from any cause of harm, and applying first aid techniques to prevent worsening of the condition, such as applying pressure to stop a bleed becoming dangerous. Victim should be in half sitting position with head, shoulder & neck support. (Fig 1)

 Promote recovery : First aid also involves trying to start the recovery process from the illness or injury, and in some cases might involve completing a treatment, such as in the case of applying a plaster to a small wound.

Fig 1 CASUALTY SHOULD BE IN A HALF SITTING POSITION WITH HEAD, SHOULDERS AND KNEES SUPPORTED

Training : Basic principles, such as knowing to use an adhesive bandage or applying direct pressure on a bleed, are often acquired passively through life experiences. However, to provide effective, life-saving first aid interventions requires instruction and practical training. This is especially true where it relates to potentially fatal illnesses and injuries, such as those that require Cardio Pulmonary Resuscitation (CPR), these procedures may be invasive and carry a risk of further injury to the patient and the provider. As with any training, it is more useful if it occurs before actual emergency, and in many countries, emergency ambulance dispatchers may give basic first aid instructions over the phone while the ambulance is on the way.

Training is generally provided by attending a course, typically leading to certification. Due to regular changes in procedures and protocols, based on updated clinical knowledge, and to maintain skill, attendance at regular refresher courses or re-certification is often necessary. First aid training is often available through community organizations such as the red cross and St. John ambulance.

ABC or First-aid : ABC stands for Airway, Breathing and Circulation

Airway : Attention must first be brought to the airway to ensure it is clear. Obstruction (choking) is a life-threatening emergency. (Fig 2)

Breathing : Breathing if stops, the victim may die soon. Hence means of providing support for breathing is an important next step. There are several methods practiced in first-aid.



Circulation : Blood circulation is vital to keep person alive. The first aiders now trained to go straight to chest compressions through CPR methods. (Fig 3 & Fig 4)



When providing first aid one needs to follow some rule. There are certain basic norms in teaching and training students in the approach and administration of first-aid to sick and injured. (Fig 5)

Not to get panic : Panic is one emotion that can make the situation more worse. People often make mistake because they get panic. Panic clouds thinking and causes mistakes. First-aider need calm and collective approach. if the first-aider himself is in a state of fear and panic gross mistakes may result. It's far easier to help the suffering, when they know what they are doing, even if unprepared to encounter a situation. Emotional approach and response always lead to wrong doing and may cloud one to do wrong procedures. Hence be calm and focus on the given situation. Quick and confident approach can lessen the effect of injury.

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Call medical emergencies : If the situation demands, quickly call for medical assistance. Prompt approach may save the life.

Surroundings play vital role : Different surrounding require different approach. Hence first-aider should study the surrounding carefully. In other words, one need to make sure that they are safe and are not in any danger as it would be of no help that the first aider himself get injured.

Do no harm : Most often, enthusiastically practiced First-Aid Viz. administering water when the victim is unconscious, wiping clotted blood (which acts as plug to reduce bleeding), correcting fractures, mishandling injured parts etc., would leads to more complication. Patients often die due to wrong FIRST-AID methods, who may otherwise easily survive. Do not move the injured person unless the situation demands. It is best to make him lie wherever he is because if the patient has back, head or neck injury, moving him would cause more harm.

This does not mean do nothing. It mean to make sure that to do something the care givers feel confident through training would make matters safe. If the first-aider is not confident of correct handling it is better not to intervene of do it. Hence moving a trauma victim, especially an unconscious one, need very careful assessment. Removals of an embedded objects (like a knife, nail) from the wound may precipitate more harm (e.g., increased bleeding). Always it is better to call for help.

Reassurance : Reassure the victim by speaking encouragingly with him.

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Stop the bleeding : If the victim is bleeding, try to stop the bleeding by applying pressure over the injured part.

Golden Hours : India have best of technology made available in hospitals to treat devastating medical problems viz. head injury, multiple trauma, heart attack, strokes etc, but patients often do poorly because they don't gain access to that technology in time. The risk of dying from these conditions, is greatest in the first 30 minutes, often instantly. This period is referred to as golden period. By the time the patient reach hospitals, they would have passed that critical period. First-aid care come handy to save lives. It helps to get to the nearest emergency room as quickly as possible through safe handling and transportation. The shorter that time, the more likely the best treatment applied. (Fig 6)



Maintain the hygiene : Most importantly, first-aider need to wash hands and dry before giving any first aid treatment to the patient or wear gloves in order to prevent infection.

Cleaning and Dressing (Fig 7): Always clean the wound thoroughly before applying the bandage. Lightly wash the wound with clean water.



Not to use local medications on cuts or open wounds. They are more irritating to tissue than it is helpful. Simple dry cleaning or with water and some kind of bandage are best.

Stay with the victim until help arrives : Try to be a calming presence for the victim until assistance can arrive.

Unconsciousness

Loss of consciousness may threaten life if the person is on his back and the tongue has dropped to the back of the throat, blocking the airway. Make certain that the person is breathing before looking for the cause of unconsciousness. If the injuries permit, place the casualty in the recovery position with the neck extended.(Fig 8) Never give anything by mouth to an unconscious casualty.



Unconscious also referred as **coma**, is a serious life threatening condition, when a person lie totally senseless and do not respond to calls, external stimulus. But the basic heart, breathing, blood circulation may be still intact, or they may also be failing if unattended it may lead to death.

The condition arises due to interruption of normal brain activity. The causes are too many.

- Shock (Cardiogenic, Neurogenic)
- Head injury (Concussion, Compression)
- Asphyxia (Obstruction to air passage)
- Extremes of Body temperature (Heat, Cold)
- Cardiac Arrest (Heart attack)
- Stroke (Cerbro-vasular accident)
- Blood loss (Haemorrhage)
- Dehydration (Diarrohoea & vomiting)
- · Diabetes (Low or high sugar)
- Blood pressure (Very low or vey high)
- Over dose of alcohol, drugs
- Poisoning (Gas, pesticides, bites)
- Epileptic Fits (Fits)
- Hysteria (Emotional, Psychological)

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The following symptoms may occur after a person has been unconscious : (Fig 9)

- Confusion
- Drowsiness
- Headache

- Inability to speak or move parts of his or her body (see stroke symptoms)
- Light headedness
- Loss of bowel or bladder control (incontinence)
- Rapid heartbeat (Palpitations)
- Stupor



First aid

- Call emergency number.
- Check the person's airway, breathing and pulse frequently. If necessary, begin rescue breathing and CPR.
- If the person is breathing and lying on the back, and after ruling out spinal injury, carefully roll the person onto the side, preferably left side. Bend the top leg so both hip and knee are at right angles. Gently tilt the head back to keep the airway open. If breathing or pulse stops at any time, roll the person on to his back and begin CPR.
- If there is a spinal injury, the victims position may have to be carefully assessed. If the person vomits, roll the entire body at one time to the side. Support the neck and back to keep the head and body in the same position while you roll.
- Keep the person warm until medical help arrives.
- If you see a person fainting, try to prevent a fall. Lay the person flat on the floor and raise the level of feet above and support.
- If fainting is likely due to low blood sugar, give the person something sweet to eat or drink when they become conscious. (Fig 10)



Do Not

• Do not give an unconscious person any food or drink.

- Do not leave the person alone.
- Do not place a pillow under the head of an unconscious person.
- Do not slap an unconscious person's face or splash water on the face to try to revive him.

First-aid box

Small, medium and large dressings : These are sterile pads with bandages attached that can be used to control heavy bleeding and cover minor wounds. Triangular bandages - These are an extremely versatile piece of equipment. Folded into a pad, they can be used as a cold compress or as padding around a painful area. They can provide cover for burns or large scrapes and support broken bones.

Adhesive bandage (for small wounds), Non-adhesive sterile dressings (various sizes), safety tape, adhesive tape and hypoallergenic tape. Dressing can be cut to size and used to cover scrapes, burns and small wounds.

Gauze swabs : For use with water to clean wounds.

Ace bandages, compression bandages, tubular bandage : For use in providing support to sprains and strains.

Disposable gloves : For use in managing body fluids.

Blunt-ended scissors : tweezers.

Transport safety : Use one of the most safer methods.

CPR (Cardio-Pulmonary Resuscitation) : CPR can be life sustaining. If one is trained in CPR and the person is suffering from choking or finds difficulty in breathing, immediately begin CPR. However, if one is not trained in CPR, do not attempt as you can cause further injury. But most people do it wrong. This is a difficult procedure to

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do in a crowded area. Also there are many studies to suggest that no survival advantage when bystanders deliver breaths to victims compared to when they only do chest compressions. Second, it is very difficult to carry right maneuver in wrong places. But CPR, if carefully done by highly skilled first-aiders is a bridge that keeps vital organs oxygenated until medical team arrives.

Declaring death : It is not correct to declare the victim's death at the accident site. It has to be done by qualified medical doctors.

How to report an emergency?

Reporting an emergency is one of those things that seems simple enough, until actually when put to sue in emergency situations. A sense of shock prevail at the accident sites. Large crowd gather around only with inquisitive nature, but not to extend helping hands to the victims. This is common in road side injuries. No passerby would like to get involved to assist the victims. Hence first-aid management is often very difficult to attend to the injured persons. The first-aiders need to adapt multitask strategy to control the crowd around, communicate to the rescue team, call ambulance etc., all to be done simultaneously. The mobile phones helps to a greater deal for such emergencies. Few guidelines are given below to approach the problems.

Assess the urgency of the situation. Before you report an emergency, make sure the situation is genuinely urgent. Call for emergency services if you believe that a situation is life-threatening or otherwise extremely disruptive.

- A crime, especially one that is currently in progress. If you're reporting a crime, give a physical description of the person committing the crime.
- A fire, if you're reporting a fire, describe how the fire started and where exactly it is located. If someone has already been injured or is missing, report that as well.
- A life-threatening medical emergency that requires immediate attention. If you're reporting a medical emergency, explain how the incident occurred and what symptoms the person currently displays.
- A car crash Location, serious nature of injuries, vehicle's details and registration, number of people involved etc.

Call emergency services : The emergency number varies - 100 for Police & Fire, 108 for Ambulance.

Report your location : The first thing the emergency dispatcher will ask is where you are located, so the emergency services can get there as quickly as possible. Give the exact street address, if you're not sure of the exact address, give approximate information.

Give the dispatcher your phone number : This information is also imperative for the dispatcher to have, so he or she is able to call back if necessary.

Describe the nature of the emergency : Speak in a calm, clear voice and tell the dispatcher why you are calling. Give the most important details first, then answer the dispatcher's follow-up questions as best you can.

Do not hang up the phone until you are instructed to do so. Then follow the instructions you were given.

How to do basic first aid?

Basic first aid refers to the initial process of assessing and addressing the needs of someone who has been injured or is in physiological distress due to choking, a heart attack, allergic reactions, drugs or other medical emergencies. Basic first aid allows one to quickly determine a person's physical condition and the correct course of treatment.

Important guideline for first-aiders

Evaluate the situation (Are there things that might put the first-aider at risk)? When faced with accidents like fire, toxic, smoke, gases, an unstable building, live electrical wires or other dangerous scenario, the first-aider should be very careful not to rush into a situation, which may prove to be fatal.

Remember A-B-Cs : The ABCs of first aid refer to the three critical things the first-aiders need to look for.

- Airway Does the person have an unobstructed airway?
- Breathing Is the person breathing?
- Circulation Does the person show a pulse at major pulse point (Wrist, carotid artery, groin)

Avoid moving the victim: Avoid moving the victim unless they are in immediate danger. Moving a victim will often make injuries worse, especially in the case of spinal cord injuries.

Call emergency services : Call for help or tell someone else to call for help as soon as possible. if alone in at the accident scene, try to establish breathing before calling for help, and do not leave the victim alone unattended.

Determine responsiveness : If a person is unconscious, try to rouse them by gently shaking and speaking to them.

If the person remains unresponsive, carefully roll them onto the side (recovery position) and open his airway.

- Keep head and neck aligned.
- Carefully roll them onto their back while holding his head.
- Open the airway by lifting the chin.

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OSH & ENVIRONMENT EDUCATION

Look, listen and feel for signs of breathing : Look for the victim's chest to rise and fall, listen for sounds of breathing.

If the victim is not breathing, see the section below.

 If the victim is breathing, but unconscious, roll them onto their side, keeping the head and neck aligned with the body. This will help drain the mouth and prevent the tongue or vomit from blocking the airway.

Check the victim's circulation: Look at the victim's color and check their pulse (the carotid artery is a good option; it is located on either side of the neck, below the jawbone). if the victim does not have a pulse, start CPR.

Treat bleeding, shock and other problems as needed: After establishing that the victim is breathing and has a pulse, next priority should be, to control any bleeding. Particularly in the case of trauma, preventing shock is the priority. Some of the ways are mentioned in Fig 11, 12, 13 & 14 how to handle victims.

 Stop bleeding : Control of bleeding is one of the most important things to save a trauma victim. Use direct pressure on a wound before trying any other method of managing bleeding.









- **Treat shock**: Shock, a loss of blood flow to the body, frequently follows physical and occasionally psychological trauma. A person in shock will frequently have ice cold skin, be agitated or have an altered mental status, and have pale color to the skin around the face and lips. Untreated, shock can be fatal. Anyone who has suffered a severe injury or life-threatening situation is at risk for shock.
- **Choking victim :** Choking can cause death or permanent brain damage within minutes.
- **Treat a burn :** Treat first and second degree burns by immersing or flushing with cool water. Don't use creams, butter or other ointments, and do not pop blisters. Third degree burns should be covered with a damp cloth. Remove clothing and jewellery from the burn, but do not try to remove charred clothing that is stuck to burns.
- **Treat a concussion :** If the victim has suffered a blow to the head, look for signs of concussion. Common symptoms are; loss of consciousness following the injury, disorientation or memory impairment, vertigo, nausea and lethargy.
- **Treat a spinal injury victim :** If a spinal injury is suspected, it is especially critical, not move the victim's head, neck or back unless they are in immediate danger.

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Employability Skills - OSH & Environment Education

Idea of basic provisions for OSH, Safety and Health

Objective: At the end of this lesson you shall be able tostate the basic provisions of safely, health, welfare under legislation of India.

India has legislation on occupational health and safety for over 50 years. A safe and health work environment is the basic right of every worker. The constitutional provision for occupational safety and health under the Article 24 - No child below the age of fourteen years shall be employed to work in any factory or mine or engaged in other hazardous employment.

Article 39 (e & f) - The state shall in particular direct its policy towards securing.

- e that the health and strength of workers, men and women, and the tender age of children are not abused and that citizens are not forced by economic necessity to enter vocations unsuited to their age and strength.
- f That children are given opportunities and facilities to develop in healthy manner and in conditions of freedom and dignity and that childhood and youth are protected against exploitation and against moral and material abandonment.

Article 42 - The state shall make provision for securing just and human conditions of work and maternity relief.

National policy

Safety and health occupies a very significant position in India's constitution which prohibits employment of children under 14 in factories, mines and in hazardous occupations. Policy aims to protect the health and strength of all workers. It prevents employment in occupations unsuitable for the age and strength of the workers. It is the policy of the state to make provisions for securing just and humane conditions of work. The constitution provides a broad framework under which policies and programmes for occupational health and safety could be established.

National Legislation

Legislation provides an essential foundation for safety. To be meaningful and effective legislation should be reviewed and updated regularly as scientific knowledge develops.

The most important legislation cover occupational safety, health and welfare are :

- The Factories Act 1948. amended 1954, 1970, 1976, 1987.
- The Mines Act, 1952.
- The dock workers (safety, health and welfare) Act, 1986.
- The plantation labour Act, 1951.
- The Explosives Act, 1984.
- The Petroleum Act, 1934.
- The Insecticide Act, 1968.
- The Indian Boilers Act, 1923.
- The Indian Electricity Act, 1910.
- The Dangerous Machines (Regulations) Act, 1983.
- The Indian Atomic Energy Act, 1962.
- The Radiological Protection Rules, 1971.
- The Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989.

Introduction to Environment

Objectives: At the end of this lesson you shall be able to

- state the meaning and definition of environment
- list out and explain the components of environment
- explain atmosphere and its composition
- state the relationship between society and environment
- state the factors responsible for destruction and natural disasters
- · learn right attitudes towards environment and maintenance in-house environment.

Environment Education is a process which makes the world community conscious about the problem of the environment. By this way we may understand the problem and find its solution and may also protect future problems.

Environmental Education (EE) can be linked with three main components

- Education about the environment (Knowledge).
- Education for the environment (Values, attitudes & positive actions).
- Education through the environment (A resource).

Meaning and definition of environment

In general, the word **environment** refers the cover of our surroundings, which includes our earth, soil, water and the atmosphere situated on it. The environment is the important system which covers all the living and nonliving system. So it is necessary every layman and literate person to know its meaning.

The word environment is composed of two words-**'environ'** and **'ment'** their meaning is 'to surround' or 'to enwrap', which gives the meaning of sense of situation of the surroundings or cover. The dictionary meaning of the environment is the "particular surroundings in which living and non-living things exist".

In universal encyclopedia, it is defined as "Environment is the sum of all those condition, systems and influences which influence the development life and death of organisms and their species. On **5th June** every year **world environment** day is celebrated.

Some eminent scholars defined the environment as follows:-

According to **E.J.Ross**, "Environment is an external force which influences us"

According to **Dr. D.H. Davis**, "In relation to man environment means all those physical forms spread all around man on land by which he is influenced continuously.

According to **Kovits**, "Environment is the sum of all those external conditions which influences the development cycle of the organisms on the surface of the earth.

Components of Environment

The components of environment can be classified as shown in the flow diagram.



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Land, water, air, soil etc are important inanimate (or) abiotic components. Man, animal, plants and other organisms are biotic components.

Natural Environment

The natural environment is the environment, which comes into existence without interference of man.

Billion years ago earth had surroundings which were not suitable for the existence of any kind of life. Then a mass of gaseous-chemical with hot temperature in which the organisms cannot exist. Due to the process of action and reaction of these chemicals after millions of years, the suitable condition of environment came to exist.

Many components together co-ordinated to form a natural environment which helps in substance of life. The natural environment components can be classified into two

- 1 Abiotic components
- 2 Biotic components

1 Abiotic components

These components are not living but can support other living organisms. When these components became unbalanced and they cause for total to the living organisms. Some kinds of such organisms are given below :

- (i) **Inorganic substances :** The elements which are taken up by the plants with the help of sunlight and converted into food. The examples of such inorganic elements are like nitrogen, calcium, phosphorus, hydrogen, carbon di-oxide and oxygen.
- (ii) Organic substances : The substances which are taken in the form of inorganic materials from the food source and are again sent back to the environment after decomposition by decomposers. E.g. Carbohydrates, proteins, fats etc.
- (iii) **Physical factors :** These factors have direct effect on living organisms, which are climatic conditions like temperature, rainfall, wind, humidity, soil and light energy which is used by the plants for the preparation of food.
- (iv) **Lithosphere :** The outermost layer of the earth (i.e.) soil or land.
- (v) **Hydrosphere :** Part of the earth having water resources like oceans, rivers, ponds and lakes.
- (vi) **Atmosphere :** It is a cover around the earth composed by variety of gases which protects the living organisms from various harmful cosmic radiations.

2 Biotic components of environment

The area in which the life is possible is called as biosphere. All living organism in the biosphere depends upon one another and these organisms exist in the biosphere forming the following community.

(i) **Producers :** The green plants presents on earth surface which produces their own food only once by the process of photosynthesis in sunlight, water and

carbon dioxide forms food for other organisms. E.g. Sugar, carbohydrates etc.

- (ii) Consumer : This organisms directly (or) indirectly depends upon the green plants for the source of food.
 E.g. All animals including man.
- (iii) **Decomposers :** These are micro organisms which decompose the complex compounds in the dead organic matter of plants and animals and again recycle the elements into the environment. E.g. Bacteria's and fungi.

Attitude towards environment

Enivironmental attitudes provides a good undersanding of the set of beliefs, interests, or rules that influence environmentalism or pro-environmental action, If the schools inculcate in children positive values and attitude towards environmental conservation they would take an active role in consuing environment and resources, and hence preserve than for future generation.

Skill objectives should be achieved for identifying and solving environmental problems, and active participation at all levels in working towards resolution of environmental problems.

Maintenance of in-house environment in the key to a healthy and safe home environment. When a house is kept clean it is less likely to develop porblems that will turn into an unhealthy environment, prolblems may range from poor air quality to drafts disease carrzying rodents and invasive insects, even problems inthe dangerous gases emanating form sources will be major concern for maintenance, controlling dust keeping floors vaccumed from time to time, checking exterior, windows wall, keeping moisture control, keeping air filters cleaned often, maintaining effectively the heating and cooling systems (HUAC) are part of the maintenance in-house environment

Man-made environment

The man is the highest of all creatures on this earth, who has started modifying the environment according to his own needs and its consequences which he faces every day. The recent developments in the under developed countries lead to more critical conditions.

The conditions of the villages are worse because there is no sewerage and sanitation system. The competition in the villagers for the increase in production of agricultural products leads to more and more use which ultimately spoils the environment and alter the composition of natural products.

Atmosphere

The earth is a dynamic planet. It is constantly undergoing changes inside and outside of the earth.

Just like onion, the earth is made up of several concentric layers with one inside (Fig 1)

The uppermost layer over the earth's surface is called the 'crust'. It is the thinnest of all the layers and is about 35km on the continental masses and only 5km on the

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ocean floors. The main mineral constituents of the continental mass are the 'silica and alumina', called as 'sial'. The oceanic crust mainly consists of silica and magnesium, called as 'sima'.



Just beneath the crust is the mantle which extends upto a depth of **2900km** below the crust.

The innermost layer is the **core** with a radius of about 350km. It is made up of nickel and iron and is called **'nife'**. The central core has very high temperature and pressure.

The earth is surrounded by a huge blanket of air called **atmosphere.** All living things on this earth depend on the atmosphere for their survival. It provides the air to breathe and protects from the harmful effects of the sun's rays. It is the mass of air that has made the temperature on the earth liveable.

Atmosphere & its composition

The atmosphere is a thin layer of gases which stays above the earth due to the force of gravitation. It's air is colourless, odourless and tasteless.

The air is actually a mixture of many gases. Nitrogen and oxygen are two major gases of the atmosphere. Carbon dioxide (CO_2) , Helium, Ozone, Organ and hydrogen are found in lesser quantities. Apart from these gases, tiny dust particles are also present in the air. The pie chart (Fig 2) shows the percentage of gases in the atmosphere.



Nitrogen is the most plentiful gas in the air. The plants need nitrogen for their survival. But they cannot take nitrogen directly from the air. Bacteria in the soil and roots of same plants take nitrogen from the air and change its form that plants can use it.

Oxygen (O_2) is the second most plentiful gas in the air. Humans and animals take oxygen from the air to breathe.

Green plants produce oxygen during photosynthesis. So oxygen content in the air remains constant.

Carbon dioxide (CO_2) to make their food and release oxygen. Humans or animals release carbon dioxide. The amount of carbon dioxide released by human (or) animals equal to the amount used by the plant make perfect balance.

This balance is upset by burning fuels (coal and oil). They add billions of tons of carbon dioxide into the atmosphere each year. This increased volume of carbon dioxide is affecting the earth's weather and climate.

Atmospheric gases

The quantities of various gases.

SI. No	Name of the gases	Percentage
1	Nitrogen	78.03%
2	Oxygen	20.99%
3	Argon 0.94%	
4	Carbon dioxide	0.03%
5	Hydrogen	0.01%
6	Helium	0.0005%
7	Neon	0.0018%
8	Cryptal	0.0001%
9	Zeon 0.000009%	
10	Ozone 0.000001%	

Structure of the atmosphere

The atmosphere is divided into five layers starting from the earth's surface (Fig 3)



- **Troposphere (0 18kms) :** This layer is the most important layer of the atmosphere. The air breath exists here. All the weather like rainfall, fog and hailstorm occur in this layer.
- Stratosphere (18 50kms) : Above the troposphere lies the stratosphere. It is free from clouds and making continuous most ideal for flying Aeroplanes. It contains a layer of ozone gas, and it protects from the harmful effect of the sun rays.
- **Mesosphere (50 85kms) :** It is the third layer of the stratosphere. Temperature drops to about -95°C.

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- **Thermosphere(85 500kms) :** In this layer, the temperature rises very rapidly with increasing height. Ionosphere is a part of this layer. It helps in radio transmission.
- Exosphere(500 1600kms) : The upper most layer of the atmosphere is called as exosphere. It is very thin air. Temperature is very high due to direct solar radiation. Light gases like helium and hydrogen float into the space from here.

Relationship between the society and environment

Technological development was an important need of man in the ancient period but after that it became his habit because the facilities received from technology in the initial stage (or) in under developed storage ultra modern technology has affected environment more.

Nature controls pity mistakes of man, concerned with the environment by a self regulatory process and keep live environment in balance.

But continuous changes have attained such proportion that even the self regularly capacity of the nature has not been able to keep lie environmental balance. Due to this environmental problem have come into the force.

In ancient period the man used to collect his food in the form of fruits and roots and took shelter in the caves. This activity did not have any bad effect on the environment because his necessities were limited. When the man learnt to produce fire from the stone, then with the first invention in the field of technology was recognised. For cooking food, the man started making tools for cutting wood. It was the second stage of the advancement of technology in which he used his intellect according to his need.

In order to satisfy the needs for food, the man started propagation of plants which were good for his health. He recognised these plants, the fruits, leaves, stem and roots which were useful to him. The availability of resources at one place lead to increase the population, so people started migrating from one place to another. They cut down the forests for converting them into agricultural land. From this period onwards the process for a continuous change in the man and environment relation started.

For satisfying his economic needs man has developed science and technology to a great extent. To make the resources available in the increasing of population, ultra modern technology was developed. To satisfy his curiosity, the ambitions, man has started moving in the direction of achieving 'victory over nature'. A change in this outlook has also occurred. He has changed into a 'technology man'. Aspiring for an ownership over nature, he has started using the natural resources excessively.

The following physical changes for economic and industrial development

- New agriculture practice was adopted for more production crops to use hybrid seeds, and improved methods of irrigation to be adopted
- Use of machines in agriculture, chemical fertilizer are increased.

- Dams were made on the rivers; cannels were dug for irrigation and supply the storage of water.
- Roads and bridges were constructed.
- Construction of underground land and atmospheric explosions under nuclear programmes.

Environment problems created by man

Man has created problems with the nature and the environment which have become danger. Some of them are :

1 Depletion of ozone layer

Many gases are present in the atmosphere. In the upper portion of the stratosphere nearly 25km thick layer of **ozone gas,** known as **ozonosphere** which acts as a safety shield for the living things. Oxygen gas is converted into ozone gas and it forms a thick layer in the atmosphere. **Ozone layer** absorbs the sun rays and protects the flora present on the earth.

Scientist discovered the causes of depletion of ozone gas as follows.

- Man made Chloro Fluro Carbon (CFC)
- Excess of nitric oxide (NO) in the atmosphere
- Radiations from the nuclear centres.
- Gases released by explosion of atomic bombs.
- Chlorine gas related in volcano eruptions
- Polar cyclones.

What is CFC?

Chloro Fluro Carbons (CFC) constitute a family of manmade chemical compound. It was invented in the 1930's. They are non toxic and harmless to handle. CFCs are extremely stable and non-flammable. This stability gives them a long life span in the atmosphere allowing its transport to the stratosphere. In stratosphere, ultra violet radiation releases chlorine from the rest of the molecule. A single chlorine atom can destroy thousands of molecules of ozone

The scientist discovered a hole of 40km diameter, in the ozone layer above the South Pole. This ozone layer is affected by **polar cyclones**.

2 Green house effect

There is a delegate balancing act occuring everyday all across the earth, involving the radiation the planet receives from space & the radiation that reflected back to the space.

The solar radiation strikes the earth atmosphere in the form of visible llight plus UV,IR and other type of radiation that are not visible to the human eye.

It occurs due to increase of the percentage of carbon dioxide in the atmosphere. It absorbs the solar rays and energy of the sun due to which the temperature on the earth increases and natures balance gets disturbed. Our vehicles and industries are continuously increasing the amount of carbon dioxide in the atmosphere.

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Solution to environment problems

By the **"Environment education"** only the environment pollution can be protected. Through the medium of education only human ideology and point of view can be changed. New sources of energy should be encouraged such as **solar energy, wind energy, biogas** and the use of **biodiesel in vehicles**. Such technology must be developed by which the natural sources and resources are used to the minimum and our environment and earth remains clean.

Personal and family responsibility about the environment

Man and his family can play important role in it. Their responsibilities are listed as below

- Educate awareness to prevent increasing of population
- Avoid wastage of water unnecessarily.
- Bio gas and solar cooker should be used in the place of wood as fuel.
- Cutting of trees should be prevented and the planted trees should be protected. Tree plantation on public places should be our goal.
- Insecticides and chemical fertilizers should be used in a limited quantity.
- In order to avoid noise pollution. Volume of T.V. and radio should be kept low.
- Control the use of petrol to vehicles should be used only for external essential tables.
- During festivals instead of electric lights the lamps and candles should be used. Now a days, instead of using filament lamps, CFL (Compact & Florescent Lamp) can be used.
- The domestic waste should not be thrown around. Use dustbin for such purpose.
- Use cloth bags instead of polythene bags.

Natural Disasters

Earth Quakes : The movement of lithosphere plates causes changes on the surface of the earth. When the lithospheric plates move, the surface of the earth vibrates. This vibrations can travel all round the earth. These vibrations are called as **'earth quake'.** It makes greatest damages of the buildings and environment.

The earth quake is measured with a machine called a **'seismograph'.** The magnitude of the earth quake is measured on the **'Richter scale'.**

An earth quake of 2.0 richly or less	little effect
An earth quake of 5.0 falling	Course damage from things
An earth quake more than 6.0	very strong.

Effect of destruction caused by earth quakes may be minimized by constructing earth quake resist building and construction project not to be undertaken in the sensitive area.

Volcano : It is a vent (opening) in the certain crust through which molten materials erupts and suddenly come out. It causes for mass disaster over the surface of earth. A volcano is a long narrow depression in the earth crust through which molten lava, ash and gases materials erupt. Tilt meter is one such instrument that can be implemented for volcanic activity.

Floods : Rivers can carry water according to their capacity only. Due to sudden essential rains and melting of ice the level of rivers suddenly increased. This water breaches the banks of the rivers and spread over the surrounding areas, is called as **'flood'.**

Due to the construction of roads, houses and commercial buildings, the area for flow of water and absorption in the earth reduced on maximum. The dams constructed for preventing the floods and due to digging of rivers undertaken.

Landslides : The process of sliding of the rocks and the soil downwards in the mountains due to the force of gravitation is called as **landslide.** The sudden sliding of rocks and the soil is dangerous. It is difficult to control landslide but its rate can be reduced by proper drainage of surface and ground water.and reducing erosion

Cyclones : Cyclones are a normal occurrence in coastal areas of torrid zone. Cyclones are produced in Torrid zone due to high temperature and humidity. In Atlantic Ocean they are named as **'hurricanes'** In Caribbean and northern eastern Pacific Ocean an **'Typhcon'** and in India occur as they are named as **"hilly willies or tropical cyclones.**

Storms : Storms are caused due to atmospheric depression in geographical area. Heavy storms brings severe calamity to the residential areas as well as in the agricultural fields.

Tsunami : 'Tsunami' is a Japanese word meaning 'harbour waves'. A Tsunami is a wave train or a series of waves generated in a body of water by an impulsive disturbance that vertically displaces the water column. Tsunami is generated when sea floor (Tectonic plates) abruptly crash and vertically displaces the overlying water. **Tectonic earth quakes** are associated with earth crustal deformation.

When these earthquakes occurs beneath the sea, the water above the deformed area is displaced from its equilibrium position. When layer of sea floor is elevated or subsided, Tsunami's are created.

A massive tsunami of 9.0 magnititude struck Indonesia, Southern Thailand, India (Andaman and Nicobar Islands, ECR(East Coast Road) of Tamil Nadu. Srilanka, Andhra, Kerala and Pondichery on **26th December 2004** and killing over 1,50,000 people and other damages.

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Eco-system & factors causing imbalance

Objectives: At the end of this lesson you shall be able to

- state the concept of eco-system
- state the components of eco-system
- state the factors responsible for environmental degradation
- state the meaning of environmental hazards, disasters & its types.

Concept of Eco-System

In 1935, **A.G. Tansley** defined the eco-system as a physical system in which **biotic** and **abiotic** components are included and the balance between them is rather constant. The term **'Eco'** means environment and **"system"** means internal process and a complex process of interdependence.

The accumulation of components of active abiotic environment in plants and animals is through the mean of interaction by which improvements, changes and development of the eco-system continues to happen...

"Eco-system is a system involving the interaction between a community of living organisms in a particular area and it's non-living environment."

Components of Eco-system

They are broadly grouped into Abiotic and Biotic components

- 1 Abiotic (Nonliving) components: The abiotic component can be grouped into following three categories:-
 - (i) **Physical factors :** Sun light, temperature, rainfall, humidity and pressure. They sustain and limit the growth of organisms in an ecosystem.
 - (ii) **Inorganic substances**: Carbon dioxide, nitrogen, oxygen, phosphorus, sulphur, water, rock, soil and other minerals.
 - (iii) **Organic compounds :** Carbohydrates, proteins, lipids and humus substances. They are the building blocks of living systems and therefore, make a link between the biotic and abiotic components.

2 Biotic (Living) components

- (i) **Producers :** The green plants manufacture food for the entire eco-system through the process of photosynthesis. Green plants are called **autotrophs,** as they absorb water and nutrients from the soil,
- (ii) Consumers : They are called heterotrophs and they consume food synthesized by the autotrophs. Based on food preferences they can be grouped into three broad categories.
- Herbivores (e.g. cow, deer and rabbit etc.) feed directly on plants.
- Carnivores are animals which eat other animals (eg. lion, cat, dog etc.)

• Omnivores feed upon both plants and animals e.g. human, bears and crows

(iii) Decomposers:

They are also called **saprotrophs**. These are mostly bacteria and fungi that feed on dead decomposed and the dead organic matter of plants and animals by secreting enzymes outside their body on the decaying matter. They play a very important role in recycling of nutrients. They are also called **detrivores** or **detritus feeders**.

Food Chain

"Transfer of food energy from the plants through a series of organisms is referred as "food chain" (Fig 1) If one species in food chain gets affected or becomes extinct, then the species in the subsequent tropical level is also affected.



Food Web

"The interlocking pattern of various food chain in an ecosystem is known as food web".

In food web, many food chains are interconnected where different types of organism are connected at different tropical level. If one species gets affected, it does not affect other tropical levels so seriously as there are number of options available at each tropic level. (Fig 2)



Environmental degradation

The meaning of environmental degradation is the decline in the quality of the whole environment which is due to the contrary changes caused by the activities of man which has a bad effect on the whole bio community and the human society.

The cause of degradation of the air of the environment can be pollution, natural hazards and calamities. The natural activities may produce crisis and calamity, suddenly (ie) earth quake, flood etc. and may be caused by the human activities (ie) by breaking of the dam, explosion by nuclear bombs etc.

The environment pollution due to the activities of man occur slowly as increase in population or population explosion, urbanization, industrialization, development of the means of transport, establishment of factories are polluting the environment gradually and continuously.

The environment degradation has a direct effect on the ecology by which the balance of the ecology gets disturbed because it causes decline in the quality of the eco-system.

The imbalance in ecology is an indicator of degradation of the environment.

Causes of environmental degradation

The basic causes of the degradation of environment are as follows.

(i) **Natural process :** Tremors, earthquake, storms, floods, forest fire, draught and excessive rains etc. The man has no control over these because these processes occur all of a sudden.

- (ii) **Human activities** : These activities can be controlled. These have a slow and continuous effect of the following causes.
- The development of modern technology.
- · Increase in population and its explosion.
- Move pressure by excessive use of natural resources.
- Industrial development and opening of factories.
- Housing problem due to urbanisation and pollution problem.
- Excessive development of economic tasks by man.
- Use of chemical fertilizers and insecticides in the agricultures.

Environmental hazards and disaster

'Environmental Hazard' may be stated as those extreme events caused by natural process (or mains activities which exceeds the tolerance magnitude within or beyond certain time limits, make adjustment difficult, result in losses of property and lives. The seriousness of environmental disaster can be estimated by the loss of life and property of the human society. The decline in the quality of the environment (or) the factors leading to its destruction are called **hazards** or **disasters**.

When due to physical process the hazards and disaster happen all of sudden and the human life.

Based on the casual factors, they are also divided into two subgroups

- 1 Natural hazards
- 2 Man induced hazards.



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- I Natural hazards : These are caused by natural factors. These can be divided into three groups ;
- **Terrestrial hazards :** arises on the surface of the earth (ie) tremors, earthquakes, volcanoes and forest fires etc.
- Atmospheric hazards : due to imbalance in the environment (ie) excessive rains, storms, cyclones, typhoon etc.
- **Cumulative atmospheric hazards** : The human activities have immediate effect such as forest fires, demolishing mountains, release of poisonous gases from the factories, nuclear explosion etc. The rivers get flooded due to breach in Dam losts of life, property, the crops and houses are destroyed.

II Man induced hazards and disasters

The environment degradation is also made by the activities of human. The hazards and the damages done by the man cannot be compensated. Man made hazards and disasters by their nature can be spontaneous or deliberate.

They have been divided into three groups

- Physical hazards : Tremors, landslides, soil erosion.
- **Chemical hazards :** Release of toxic gases from the tanks in the factories, gases produced by the factories air pollution by vehicles, nuclear experiments, sinking of oil ships in the sea or catching of fire by them.
- Social hazards : Increase is population or population explosion, decline of religions valves, giving importance to economic valves, use of nuclear power in war.

Pollution and Pollutants

Objectives: At the end of this lesson you shall be able to

- define the meaning of pollution
- list out various kinds of environmental pollution
- define the meaning of pollutant
- state various type of hazardous waste management
- list out the causes of indoor environment pollution and suggestion to keep the environment safe.

The quality of the environment has declined due to environmental pollution. In industrial and technological progress of man, the chemical and nuclear energy, poisonous gases and other industrial workers have polluted the environment by which the quality for the environment is affected.

Pollution

An undesirable change in the quality of physical, chemical and biotic substances, air, water and soil is called **pollution.** This change is harmful for the health and life of living things. The pollution brings a change in some aspect of the biosphere in a direct or an indirect manner, which leaves a bad effect on the living beings and the humans.

There are mainly two kinds of pollutions. They are

1 Physical pollution

A decline in physical elements of the environment caused by man's activities is called as **physical pollution**. It can be divided into three sub parts

- Air pollution occurs when gases, dust particles, fumes (or smoke) or odour are introduced into the atmosphere in a way that makes it harmful to humans, animals and plant.
- Air pollution can result from both human and natural actions. Natural events that pollute the air include forest fires, volcanic eruptions, wind erosion, pollen dispersal, evaporation of organic compounds and natural radioactivity.

Human activities that result in air pollution include:

- Emissions from industries and manufacturing activities : Chimneys of manufacturing plant with lots of smoke and fumes coming out of it. Waste incinerators, Manufacturing industries and power plants emit high levels of carbon monoxide, organic compounds, and chemicals into the air. Petroleum refineries also release lots of hydrocarbons into the air.
- Burning Fossil Fuels : Cars, heavy duty trucks, trains, shipping vessels and airplanes all burn lots of fossil fuels to work. Fumes from car exhaust contain dangerous gases such as carbon monoxide, oxides of nitrogen, hydrocarbons and particulates. On their

own, they cause great harm to people who breath them. Additionally, they react with environmental gases to create further toxic gases.

• Household and Farming Chemicals : Crop dusting, fumigating homes, household cleaning products or painting supplies, over the counter insect/pest killers, fertilizer dust emit harmful chemicals into the air and cause pollution. In many case, when we use these chemicals at home or offices with no or little ventilation, we may fall ill if we breathe them.

Air pollution prevention, monitoring and solution.

Solution efforts on pollution are always a big problem. This is why prevention and interventions are always a better way of controlling air pollution. These prevention methods can either come from government (laws) or by individual actions. In many big cities, monitoring equipment has been installed at many points in the city. Authorities read them regularly to check the quality of air.

• Government (or community) level prevention

Governments throughout the world have already taken action against air pollution by introducing green energy. Some governments are investing in wind energy and solar energy, as well as other renewable energy, to minimize burning of fossil fuels, which cause heavy air pollution.

Governments are also forcing companies to be more responsible with their manufacturing activities.

Car manufacturing companies are also building more energy efficient cars, which pollute less than before.

Individual Level Prevention

- Encourage your family to use the bus, train or bike when commuting. If we all do this, there will be less cars on road and less fumes.
- Use energy (light, water, boiler, kettle and fire woods) wisely. This is because lots of fossil fuels are burned to generate electricity, and so if we can cut down the use, we will also cut down the amount of pollution we create.
- Recycle and re-use things. This will minimize the dependence of producing new things. Remember manufacturing industries create a lot of pollution, so if we can re-use things like shopping plastic bags, clothing, paper and bottles, it can help.

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Water pollution is the contamination of water bodies (e.g. lakes, rivers, oceans, aquifers and groundwater), very often by human activities. Water pollution is very harmful to humans, animals and water life. The effects can be catastrophic, depending on the kind of chemicals, concentrations of the pollutants and where there are pollution. The effects of water pollution are varied and depend on what chemicals are dumped and in which locations.

Many water bodies near urban areas (cities and towns) are highly polluted. This is the result of both garbage dumped by individuals and dangerous chemicals legally or illegally dumped by manufacturing industries, health centres, schools and market places. Some of the effects of water pollution are:

Death of aquatic (water) animals

The main problem caused by water pollution is that it kills life that depends on these water bodies. Dead fish, crabs, birds and sea gulls, dolphins, and many other animals often wind up on beaches, killed by pollutants in their habitat (living environment).

Disruption of food-chains

Pollution disrupts the natural food chain as well. Pollutants such as lead and cadmium are eaten by tiny animals. Later, these animals are consumed by fish and shellfish, and the food chain continues to be disrupted at all higher levels.

Diseases

Eventually, humans are affected by this process as well. People can get diseases such as hepatitis by eating seafood that has been poisoned. In many poor nations, there is always outbreak of cholera and diseases as a result of poor drinking water treatment, and due to contaminated water.

Destruction of ecosystems

Ecosystems (the interaction of living things in a place, depending on each other for life) can be severely changed or destroyed by water pollution. Many areas are now being affected by careless human population, and this pollution is coming back to hurt humans in many ways.

Prevention of water pollution

Dealing with water pollution is something that everyone (including governments and local councils) needs to get involved with. Here are a few things we can do:

- Never throw rubbish away anywhere. Always look for the correct waste bin.
- Use water wisely. Do not keep the tap running when not in use.

- Do not throw chemicals, oils, paints and medicines on the sink drain, or the toilet.
- Buy more environmentally safe cleaning liquids for use at home and other public places. They are less dangerous to the environment.
- If you use chemicals and pesticides for your gardens and farms, be mindful not to overuse pesticides and fertilizers. This will reduce runoffs of the chemical into nearby water sources.
- If you live close to a water body, try to plant lots of trees and flowers around your home, so that when it rains, chemicals from your home does not easily drain into the water.

Land pollution is the deterioration (destruction) of the earth's land surfaces, often directly or indirectly as a result of man's activities and their misuse of land resources.

2 Social pollution

Accumulated happenings or crises have a country that affects on the social aspects is called social pollution. It can be divided into three subgroups

- Population explosion (or) growth
- Social backwardness
- · Economic pollution poverty

Pollutant

The substance, which causes a decline in the quality of environment or produces pollution in the environment is called as a pollutant. It includes any solid, liquid or gaseous substance, which by its presence (or) excess in the environment is harmful effect on the living beings and man.

Pollutants are residues from the substance which are to be thrown away after use. Water or rivers get polluted by the wastes of the cities and sewage thrown into them.

Some pollutants of the environment, are the causes to pollute the air, water resulting a decline in their quality.

Some of the main pollutants are given below

- Collected substances dust, smoke, tar etc.
- Gases Carbon dioxide, Nitrogen and sulphur dioxide.
- Solid wastes which are thrown away after use
- Radioactive substances
- Noise excessive noise of the vehicles
- Complex chemicals benzene, acid etc.
- Metals, and metallic oxides.
- Fluorides
- Photo chemical oxides.
- Agricultural chemical substances

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From the above examples the pollutants are broadly categorised into three types

- In the form of solid substances (or) matter
- In the form of liquid substances
- In the form of gases

According to the nature, pollutants can be classified into Non-degradable pollutants and Bio - degradable pollutants.

1 Non -degradable pollutants

Those pollutants which cannot be broken down into simpler, harmless substances in nature, are called nonbiodegradable pollutants. DDT, plastics, polythene, bags, insecticides, pesticides, mercury, lead, arsenic, metal articles like aluminium cans, synthetic fibres, glass objects, iron products and silver foils are nonbiodegradable pollutants. (Table1)

Table 1

SI. No.	Pollutant	Effect on human health
1	Air pollution	
	Carbon monoxide	Headache, hear stress
	• Lead	Mental and physical improvement
	Water pollution	
	Sewage pollutant	Jaundice, cholera, typhoid
	Methyl mercury	Affects nerves system, lips and tongue deadness
	Excess nitrate in drinking water	Blue body syndrome
	Radioactive pollution	Cancer, lung, breast, spot skin, genetic disorder
	Noise pollution	Stress related diseases, eardrum may be damaged
	Ozone depletion	Cataract, skin diseases, affecting immune system.

2 Bio-degradable pollutants

Hazardous waste

The waste that contains highly toxic and hazardous materials that are injurious to all living things and environment are called as hazardous and toxic work.

Hazardous waste management

Following activities are to be followed for hazardous waste management. (Table 2)

Table 2

SI. No.	Source	Type of hazardous waste
1	Chemical Industries	Acids, solvent bases
2	Workshop (mechanical)	Metal paints, lead for lead acid battery
3	Leather Industries	Solvent, acid bases
4	Paper industry	Waste - inks, solvents
5	Construction industry	Waste paints - inflammable, material wastes
6	Metal Industries	Paint waste, sludges (containing heavy metals)
7	Electronic industries	Solvents, plating and soldering solutions
8	Nuclear power plants	Spent fuel, solvents, radio -active waste
	1	

- Reduce waste generation and choose less toxic materials. In Industries, manufacturing process can be altered to eliminate (or) reduce waste.
- Recycle the solvent and acid to minimize the waste generation.
- Reuse the solvent and acids.

Handling methods of hazardous waste

The safest method to avoid hazardous waste problem is to cut down production of waste in the source itself. The methods of disposal of hazardous wastes are :

• **Physical process :** From this method, main aim is the volume reduction by Sedimentation, Absorption, Aeration, Osmosis, Ion exchange etc.

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- Chemical treatment : In this method, chemicals are added to connect the hazardous waste into non-hazardous waste. This is suitable to the waste having corrosive and reactive proportion, and its aim to neutralize pH
 Biological treatment : This process is generally followed in municipal/corroration waste treatment
- Biological treatment : This process is generally followed in municipal/corporation waste treatment plant. This process can be used, when the sludge contains high concentration of organic and low concentration of toxic substances.
- Waste incineration : This process is suitable if the waste is not subjected to complete decomposition and the waste is combusted for complete destruction.
- **OFF-site disposal :** The residue from thermal process or the untreated sludge have to be disposed in an environment, so that the soil and the ground water do not contaminate.

Indoor environment

Home or a house is such a place where family members live. Every person expects that the place should be pollution free so that he can live their conveniently. The increase in the technology and new domestic machineries and equipment is polluting the indoor environment.

A house has many such materials and appliances which cause pollutions inhouse environment and it affects out health badly but most of the people amongst us are ignorant of this environment.

Causes of the pollution of Indoor environment

There are many things in the house which cause a decline in the quality of the environment. The causes are as follows

- Mica, plywood, new wood, varnish and chemical substances are harmful to environment.
- Construction materials such as clay, lime, wood, cement, iron, concrete, plastic paints etc.
- Varnish, paints and fevicol etc. chemical substance used in making furniture's are poisonous and release poisonous gases in the indoor environment.
- The articles made of polythene and plastic has increased greatly, which pollute the air inside the soil.
- When chlorinated water is boiled it releases chlorine which leads pollution
- The kitchen is an important place in house. Where one or the other fuel is used for cooking food such as kerosene oil, petroleum gas etc. In the villages cow dung cakes and wood are burnt which produce harmful gases and smoke. The mixer, grinder, juice extruding machines and other applications used in the kitchen produce noise pollution.

- Many types of luxuries that are used at home which cause environmental pollution, namely Air-conditioner, Refrigerator, Cooling appliance which uses refregirants, television set, electronic device which uses radiating waves. CFC damages the ozone layer of the atmosphere due to which harmful UV rays from the sun come to the earth.
- Liquid waste water from bathing, washing clothes and utensils, detergents, phenyls, disinfectant, geysers, heated up water etc. when chlorinated water is heated up, it forms chloroform which leads to suffocation and death.
- During technological advertisements various home gadgets also increase in number like. Cooler, heater, blower, refrigerator, washing machines, oven, air containers, VCRs computers, Fax, perfumes release CFCs which deplete the ozone layer of the atmosphere which reflects back to harmful radiations (UV) coming from the outer sphere and sun.

Today the science has given many things of comfort and luxury to man but they leave bad effect on health.

Suggestion for keeping the Indoor environmental safe

For keeping the indoor environment clean and pure following are the suggestion.

- While constructing a house it should be kept in mind that the house is spacious airy and well lighted.
- Methanol used in the construction should be of good quality.
- Materials of chemical composition must be avoided for the construction of houses.
- Synthetic and non-bio gradable materials should be avoided.
- Kitchen and bathrooms especially be airy and open.
- · Waste from houses should be properly utilized.
- The sewage should not be sent to ground water by digging well.
- The electric appliances should be used in accordance with the instruction given on them.
- · Proper disposal of excreting products.
- Traditional fuels should be avoided.
- Use of solar energy should be encouraged in houses.
- Electric light appliance should not be installed in the house more than necessary.
- Excessive brightness should be avoided.
- The volume of various sources of entertainment like Television, tape recorder, stereo etc. should be kept as mimimun as possible.
- Reduce the use of A.C. coolers, heaters etc. at home.
- The home should be cleaned properly to avoid dust accumlation.
- The use of fragrant substances should be reduced.

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Employability Skills - OSH & Environment Education

Theory 2.3.50

Conservation of Energy, Re-use and Recycle

Objectives: At the end of this lesson you shall be able to

- define energy and law of conservation of energy
- list out and state the difference forms of energy resources
- state the importance of conservation of energy
- explain the three R's (Reduce, Reuse and Recycle)
- state about right attitude towards environment.

Energy : Energy is defined as capacity to do work. All humans, animal and plant life depend upon energy.

The **law of conservation of energy** states that the energy can neither be created nor destroyed but can be transformed from one form to another, the total energy remain conserved. Energy provides the force to hold structures together, tear them apart and move them from one place to another. No energy transformation in the present is efficient. The fossil fuel, as it is generally called is expected to exhaust in another 200 years. The energy supply side needs heavy investments and import.

Renewable (Non-Conventional) Energy Source

Renewable energy resources are natural resources which can be regenerated continuously and are inexhaustible. They can be used again and again in an endless manner. Examples are Wood, Solar energy, wind energy, hydropower, tidal energy, geothermal energy etc. These energy resources are pollution free and do not need any fuel and also does not produce any waste.



Solar Energy - The energy that we get directly from the sun is called **solar energy.** Some important solar energy harvesting devices are :

- Solar (Photovoltaic) cell : Used in calculator, electronic watches, street lamps, water pumps etc.
- Solar heat collectors : Used in cold places where houses are kept in hot condition using solar heat collectors.
- Solar water heater:

Wind Energy : The energy recovered from the force of the wind is called **wind energy.** It is available easily in many off-shore, on-shore and remote areas.

Tidal Energy : Energy produced by tides due to gravitational forces of sun and moon is called **tidal energy.** As sea water is inexhaustible, it is completely independent of uncertainity of rain fall.

Geo-thermal energy: The energy harnessed from the high temperature present inside the earth is called **geo-thermal energy.** It is effectively and efficiently used for direct uses such as hot water bath, resorts, aquaculture, green house.

Biomass Energy : Energy produced by organic matter like plants and animals are called **Biomass Energy.** Examples of biomass are wood, crop residues, seeds, cattle dung, sewage, agricultural wastes etc.. Biogas and bio fuel are examples of biomass energy.

Merits of Renewable resources

- Unlimited supply
- Provides energy security
- · Fits into sustainable development concept
- Reliable
- · decentralized energy production

Non-Renewable (Conventional) Energy Source

Non-Renewable energy resources are natural resources which cannot be regenerated once they are exhausted.. They cannot be used again. Examples are Oil, Coal, petroleum, natural gas, nuclear fuels etc..

Coal : It gives extreme heat, this energy source cannot be renewed. It is used in power houses, factories & industries.

Petroleum: It includes petrol, diesel, mobil oil and mineral oils which are used in motor vehicles, furnaces and power houses. From the modern technology, it is hoped that 3000 million ton petroleum from the earth and another 1000 million ton from the sea can be obtained.

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LPG (Liquified Petroleum Gas) : The petroleum gas obtained during cracking and fractional distillation, can easily be converted into liquid under high pressure as LPG.

Natural gas : Natural gas is formed by the decomposition of dead animal and plants, that are buried under lake and ocean under high pressure and temperature. It is found above the oil level in oil well.

Conservational of energy

"Saving of energy is the production of energy" it means that the energy is very essential. In developing country like India, possible effort should be made to save more and more energy.

The demand for electric energy is increasing at the rate of 10 percent every year. But it is not possible to increase its production at this rate. The consumption of energy is increased by 12.8 percent per year. The production of energy according to the consumption is not possible. So the only selection is that by saving energy, conserve more energy. **14th December** is celebrated as **world energy conservation day**.

Some examples of conservation of electric energy is given below:

Electric motor : Electric motors are strong means of spending energy. By applying modern technologies the expenditure of electric energy can be minimized. So it is essential the strong and quality motors must be used.

Pump : In these pumps, energy is spent through diesel engines and electric motors. Due to diesel engine the popularity of motor pump has increased and it is convenient too. By maintaining the quality diesel engine, more work can be done with less expenditure of energy.

Arrangement of light: The lights are needed in houses and industries. 17.4 percent of the total electricity is consumed for light. This consumption in future would be still more because even now the facility of electricity is not available to the all population. Excessive use of electricity should be avoided because it is exhaustible source.

Since resources are being exhausted, it is the duty of every individual on this earth to conserve resources in such a way that they must be available for future generation also. Due to advancement and population growth, the present world is facing lot of crises on natural resources.

Measures recommended for conservation of natural resources:

- Switch off lights, fans and other appliances when not in use.
- Use solar cooker for cooking food on sunny day.

- Dry clothes in sunlight instead of driers.
- Grow more trees near the house and get a cool breeze and shade. It will cut off your electricity charges on AC and coolers.
- Use pressure cooker for cooking.
- Ride bicycle or just walk instead of using car or scooter.
- Use minimum water for all domestic purpose.
- Check for water leaks in pipe and repair immediately.
- Plant more trees and protect them.
- · Minimise the use of papers and fuel wood.
- · Grassing and fishing must be controlled.

The three R's: Reduce, Reuse and Recycle (Fig 1)



These three R's (ie) Reduce, Reuse and Recycle are used to help to cut down on the amount of waste which are thrown out away. They conserve the natural resources, land fill space and energy. They save land and money communities must use to dispose of waste in land fills. All must help to active this goal and save natural resources, energy and money by following the three R's.

Reduce

The best way to manage waste is not to produce it. This can be done by shopping carefully and being aware of few guidelines.

- Buy products in bulk, larger, economic size products or ones in concentrated form use less packaging and usually cost less per ounce.
- Avoid over packaged goods, especially ones packed with several materials such as foil, paper and plastic.
- Avoid disposable goods, such as paper plates, cups, napkins, razors and lighters.
- Buy durable goods ones that are well built or that carry good warranties. They will last longer save money in the long run and same landfill space.
- At work, make two -sided photcopies whenever possible
- Maintain central files rather than using several files for individuals.
- Use electronic mail or main bulletin boards.
- Remove your name from the mailing lists of materials you no longer want to receive.

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Use a dish cloth instead of paper towels.

Reuse

It makes economic and environmental sense to reuse products and it takes creativity.

Reuse products in different ways :

- Use a coffee can to pack a lunch, use plastic mirowave dinner trays as picnic dishes.
- Sell old clothes, appliances, toys and furniture in garage sales or ads or donate them to charities.
- Use reasonable containers rather than plastic wrap.
- · Use a ceramic coffee mug instead of paper cup.
- Reuse grocery bags or bring your own cloth bags to the store.
- Do not take a bag from the store unless you need one.

Recycle

The process of changing the waste materials into new products to present waste of potentially useful materials is called as 'recycling'. Recycling is a series of steps that takes a used material and processes, remanufactures and sells it as a new product.

- Begin recycling at home and at work
- Buy products made from recycled materials. Look for the recycling symbol (or) ask store managers or salesman. The recycling symbol means one of two things either the product is made of recycled material or the item can be recycled.
- Many plastic containers have a recycling symbol with a numbered code the identifications means what type of plastic resin it is made from.
- Check collection centres and curb side pickup services to see what they accept, and begin collecting those materials. It includes, metal tins, newspapers, paper products, glass, plastics and oil.
- Consider purchasing recycled materials at work, when purchasing materials for office supply, office equipment (or) manufacturing.
- Speak to store managers and ask for products and packaging that help cut down on waste, such as recycled products and products that are not over packaged.
- Buy products made from material collected recycling.
- Use recycled paper letterhead, copier paper and newsletter.

Right attitude towards environment

Having the right attitude towards environment will help us to improve our efficiency. Creating space in our offices and homes complements the space need in our minds will become clear thinking and focused.

In our home environments are important to help us make the most of ourselves professional. An environment used to be created at home for time to unwind and regroup.

Organising your workspace

- Our work place to be organised most effectively & professionally. Make some time to restore the working space so that it reflects a mind that is calm, focussed and in control with a well managed space where you will have higher productivity.
- Get into the habit of filling things in the correct place.

Create a productive, professional ambiance

- Plants and lights in office space are for promoting calm and productivity. Plants also keep the air oxygenated which will help your thinking process.
- Ensure the plants are healthy. Having dead and dying plants around will drain your energy.
- If your office is dark and gloomy with natural light, you can create the sanction of light and space - glass top desks may be more space enhancing than a dark and dusty oak.
- Make your office ooze with charm, images having clients here with you.
- Having this right attitude to your working environment, treating with care and respect will help the same attitude to your work.

Home is your sanctuary

- Getting a good night's sleep is essential for ensuring that your daily productivity is high.
- Never take your work into the bed room with you. Leave your electronics in another room.
- Create some space away from your laptop and your phone.
- Keep surfaces clean construct piles of unread paper work anywhere in sight.
- Invert in a comfortable seating area and spend time reading a book.
- By having good night you will be able to function at your maximum potential.

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Employability Skills - OSH & Environment Education

Global warming - Ozone Layer Depletion

Objectives: At the end of this lesson you shall be able to

- state the meaning of global warming
- state the meaning of green house & its effects
- state how to control the green house effect
- state ozone gas
- state the causes, effects and preventive measures of ozone layer depletion
- state acid rain and its effects.

Global Warming

Increase in average temperature of the earth surface due to green house effect is called as **global warming.** It also refers to the increase in average temperature of the air and sea at earth's surface.

In 1987 **Jean Baptiste Joseph Fourier** a French scientist and mathematician coined the **"Green House Effect"** for trapping of heat in the atmosphere by certain gases.

There are some gases in the earth atmosphere that absorb some of the outgoing long wave radiation or heat energy. These includes Carbon dioxide (CO_2) , methane (CH_4) , Nitrogen Oxide (NO), Chlora Floro Carbon (CFC), Water vapour.

Effect of Global Warming

- Rising of global temperature causes to raise the sea level.
- Melting of glaciers, snow mountains and polar ice caps are the important resultant of global warming which leads to increase the sea level.
- The change in rainfall pattern.
- Fresh water bodies will be contaminated with the salty water of sea.
- Migration of human population takes place.
- Forest vegetation will not be able to adapt in the changing pattern of temperature and rainfall.

Meaning of Green House

In the cold countries of the world, houses which are natural that the temperature inside remains higher than outside which will not affect the growth of vegetarian. These type of houses of green glasses are called as "green house".

Carbon dioxide(CO_2) prevents the conversion of solar energy and the solar rays. It acts as a blanket in which the sun rays can enter the heat radiation emitted by the earth cannot go outside.

Now a days, the amount of carbon dioxide is increasing day by day due to Human beings activities such as industrialization and destruction of forest. The increasing of earth's temperature also affects the green house.

Green House Gases (GHG)

The major green house gases are

- Water vapour causes about 36%-70% of the green house effect.
- Carbon dioxide (CO₂) which causes 9-26%.
- Methane (CH₄) causes 4-9% and ozone (O₃) causes 3-7%.

The effects of green house and change in climate

The GHE is the process by which radiation from a planet's atmosphere warms the planet's surface to a temperature above, what it would be without its atmosphere (which contains green house gases). Earth's natural GHE is critical to supporting human life.

Due to green house effect, the following changes takes place in the climate

- · Vegetation and animals are badly affected by it.
- · Rains are greatly increased.
- It effects the eco systems balance.
- By increasing of carbon dioxide, the production will increase but the quality of crops is reduced.
- The soil would become less fertile.
- In the cold area, the winter season would become short, and it would be less cold.
- Due to industrialization and destruction of forest, produces impregrenable gases, which results into hot soil.
- The plants would have less amount of nitrogen in them. It is more affected by the insecticides.
- Due to the continuous, increasing of temp of earth, the ocean gets warm and the level of the sea water increases.
- Health of men will be badly affected, due to that the number of diseases will increase (ex. Malaria, respiratory and skin disease).
- The energy sources also will be affected badly.
- Due to scarcity of water the generation of electricity will decrease.

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Methods to control line Green House Effect

In 1979, the world environment committee decided that it is very essential to reduce or control the amount of carbon dioxide in the atmosphere.

After 13 years, the earth conference on environment and development was held in 1992 in Rio-de-geneiro (Brazil), by 182 countries participants made serious deliberation as given below

- Decreasing the quantity of carbon dioxide in the atmosphere
- Management of forests
- Change of technology
- Bio diversity
- · Sustained development
- Financial management to save the world from pollution
- The alternative bio-sources instead of petroleum products should be used.

Climate change is a change which can be related to the activities of man directly or indirectly, which changes the components of global environment and which can be seen in the natural period of time.

Mainly the climate changes can be seen by the total stock of available green house gases in the environment and not by the release of green house gases annually.

Melting of the polar ice

The depletion of ozone is increasing, the temperature of earth's surface is also increasing day by day. Due to the effect of increasing temperature the ice on the poles of the earth has started melting rapidly, then the water level of the sea is rising. By melting of the ice of the poles an imbalance in the eco-system is increasing which is very harmful.

It is essential to control the gases CFC, methane, Nitrous oxide etc. released by industries which harms the ozone layer, and 'melting' ice of the poles destroying animals and vegetation.

Rise in sea water

Due to increase in the temperature of the surface of the earth, the ice on the polar region is rapidly melting, as a result water level of the sea is upto 6cm and by the 21st century level of sea water will rise upto 65cm. So, rise in temperature should be stopped otherwise animals and plants will be affected greatly.

Kyoto conference 1977

In the atmosphere, the carbon-di-oxide is increasing and its temperature is also continuously increasing, causes dangers. So an international conference on climate was held in Dec. 1977 in the city of Kyoto in Japan. 160 countries delegates participated and made a historical agreement for prevention of change in climate due to increase in temperature of the environment of the earth. The main goal of this conference on climate change was to control the main causes of climate change and trying quality improvement in the world environment from the angle of hygiene and health.

According to this agreement various countries agreed or reducing green house gases.

European organisation - 86%, America - 7%, Japan 6%.

A provision was made in the agreement that the defaulter would be fined and the amount of fine would be voluntarily deposited in the development fund.

Ozone gas

If the Global warming continues unchecked, it will cause significant dimate change, rise in sea level, increasing ocean acidification, extreme weather events and other severe natural & societal impacts.

'Ozone' word is originated from Greek word **'Ozo'**. 'Ozo' means **'smell or odour".** This gas was first discovered by a dutch scientist **"Van Marum"**. It has a peculiar odour". Due to this odour only, it is called **ozone gas.** Sun light produces this gas. The oxygen in the atmosphere becomes active in sunlight and changes into ozone gas.

In the environment, this gas is present in a very small quantity. Ozone (O_3) contains 3 atoms of oxygen. This combination of 3 atom of oxygen present in the lower atmosphere is harmful for the human beings, but 'its' presence in the upper atmosphere is very beneficial and essential. This gas is produced itself. When the sun rays strike the upper layer of the atmosphere, then due to high energy radiation, some part of it is converted into ozone. The oxygen gas is converted into ozone by action of electricity clouds, lightening.

At a height of 20-30 km from the surface of the earth in the area of stratosphere of the atmosphere one layer is found. This layer or cover is called as **'ozone gas'**.

This gas acts as a protector of the environment. The part where the ozone gas is found is called as **ozone sphere**.

Ozone Layer Depletion

The reduction in the thickness of ozone layer in spring is called as **ozone hole.** This hole is declining in the northern hemisphere on an average rate of **4.1% annually since 1997.**

Causes of the depletion of ozone layer

The reasons for depletion of ozone layer are

- Due to the production of the compound **'Chloro Flouro Carbon'** (CFC) the ozone gas is depleting. When it reaches the stratosphere it attacks the ozone layer and reduces it. (Fig 1)
- The ozone gas layer is affected by polar cyclones.
- The chlorine gas produced by eruption of volcanoes also leaves a bad effect on ozone layer, and it is converted into carbon monoxide.
- Due to excessive amount of Nitrogen oxide in the atmosphere, it affects the ozone layer.

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• Radioactive radiation from the nuclear centres has also badly affected the ozone layer.

Effects of ozone depletion

- It produces green house effect and the climate is also changed.
- Ozone depletion results in low production of crops.
- It causes damage to the organs of living things.



- Ultra violet rays harm the plants.
- It causes to spread the skin cancer diseases.
- It increases the smoke in the cities.
- It raises the possibilities of acid rains in the urban areas..
- It increases the temperature of the environment.
- It affects the mental health of man.
- It increases the temperature of atmosphere which has a bad effects on the vegetation.
- The UV rays reaching the earth are harmful to the pregnant women and the infants children also.

Preventive measures for ozone layer depletion

In 1989 limited nations environment and development conference, serious deliberation moved to put a ban an Chloro Fluro Carbon for a fixed period of time.

- The main cause of formation of ozone hole was the use of Chloro Fluro Carbon (CFC) which is used in refrigerator industry. It harms the ozone layer therefore it should be banned all over the world
- · Smoke emitted by the aeroplane should be controlled
- Nuclear explosive strictly banned.
- · Use eco-friendly household cleaning products
- Efforts to be made for controlling the smoke emitted by transport vehicles, and in factories.

The ozone layer above India is fortunately completely protected. Because the thickness of ozone layer above the land area of India is 3 times as compared to other countries which are hinge holes in ozone layer.

Acid rain and its effects

When the quantity of acids in the raining water is more than the average, then such rain is called as 'Acid rain'.

or

When the PH of rain water or snow is less than 5.7, it is called as **acid rain.**

or

It is the precipitation of diluted acid from the atmosphere on the earth.

There are two types of depositions of acids in acid rain, they are

- Dry deposition
- Wet deposition

In dry deposition, particles of acid gases like 'NO₂, SO₂' and acid aerosols fall on the earth along with rain. It helps in making acid by dissolving in water in the soil.

In wet deposition, along with acid, water falls on the earth in the form of rain, fog or snow.

Composition of acid rain

Acid rain contains

- Sulphuric acid (H₂SO₄) ' 60% 70%
- Nitric acid (HNO₃) ' 30% -40%

Nitric acid is formed by dissolving of nitrogen peroxide (NO_2) in water. It is produced in the factories, vehicles, nitrogenous fertilizers factories by the burning of fossil fuel. Sulphuric acid is formed by dissolving sulphur dioxide gas in water. It is produced in volcanoes (67%) and factories (23%).

Due to presence of acid in the rain water, PH values falls. The average PH of rainwater is between 5-6 and 6-5.

The acid rains are the result of the activities of man and the negligence of the industrial units.

The bad effects of acid rain

- By the use of water pollutant with acid rain, man and other living beings are badly affected and the man becomes victims to many types of diseases.
- This rain reduces the lustre of the metals too.
- It decreases the reproduction process of the fishes.
- Wild life and the vegetation are harmed by it.

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- The nutrients in the soil are badly affected by this rain, ,especially the amount of iron is reduced.
- Water of the rivers, natural resources like wells and ponds gets polluted with acid rain waters. By drinking this water, both man and animals are badly affected.
- It may also causes corrosion in many buildings bridges, monuments, fencing etc.
- With the excessive acid rain, visibility is reduced.
- It decolorizes the leaf pigments.
- It causes irritation in the eyes and skin of human beings.
- Mosquitoes, flies and water insects multiply in this rain.

Employability Skills - OSH and Environment Education

Hydrological cycle - Ground and Surface water, Water treatment, Rain water harvesting

Objectives: At the end of this lesson you shall be able to

- describe the process of water cycle and its industry
- describe about the surface water, sea water and ground water
- explain the basic need of water, water components and water system on earth
- explain the importance of the water conservation
- state the necessity of water treatment
- describe the process for drinking water treatment, sewage water treatment and industrial water treatment
- list out the disinfectants of water treatment and the remedies and rain water harvesting.

Hydrologic or Water cycle

The water cycle, also known as the **hydrologic cycle** or the H_2O cycle, describes the continuous movement of water on, above and below the surface of the Earth. The mass of water on Earth remains fairly constant over time but the partitioning of the water into the major reservoirs of ice, fresh water, saline water and atmospheric water is variable depending on a wide range of climatic variables.

Water is a basic necessity of our daily life. Only 4% of portable water is available in India. Due to the increasing population in India, on an average every year 2200 cubic metre is used per year. Day by day the density of population is increasing whereas the availability of water is decreasing. The water moves from one reservoir to another, such as from river to ocean or from the ocean to the atmosphere, by the physical processes of evaporation, condensation, precipitation, infiltration, runoff, and subsurface flow. In doing so, the water goes through different phases: liquid, solid (ice), and gas (vapour).

Process of water cycles (Fig 1)

Precipitation : It is the condensed water vapour that falls to the Earth's surface . Most precipitation occurs as rain, but also includes snow, hail, fog drip,graupel, and sleet.



Evaporation : The transformation of water from liquid to gas phases as it moves from the ground or bodies of water into the overlying atmosphere. The source of energy for evaporation is primarily solar radiation. Evaporation often includes transpiration from plants, though together they are specifically referred to as **evapotranspiration**.

Run off : The variety of ways by which water moves across the land is called as run-off. This includes both surface run-off and channel run-off. As it flow, the water may either adsorb the heat from the ground, evaporate into the air or become stored in lakes or reservoirs for agricultural or other human uses.

Infiltration : The flow of water from the ground surface into the ground is filtered, the water becomes soil moisture or ground water.

Condensation : The transformation of water vapour to liquid water droplets in the air, creating clouds and fog.

Transpiration : The release of water vapour from plants and soil into the air. Water vapour is a gas that cannot be seen.

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Some facts about water

- · 136000 cubic kilometre of water is used in earth
- 70% of fresh water used by humans goes to agriculture..
- An individual drinks 61000 litres of water in his life time.
- Water is an excellent solvent for a wide variety of chemical substances.
- For production of one kilowatt electricity, 4000 gallons water is required.
- Water is the only substance that is found in solid, liquid and gaseous form.

Water system on earth

There is vast expense of water on the earth. About 70% of the earth's surface is covered with water.97% of the water on the earth is salt water. Salt water is filled with salt and other minerals, and humans cannot drink this water. Although the salt can be removed, it is a difficult and expensive process.

2% of the water on earth is glacier ice at the North and South Poles. This ice is fresh water and could be melted; however, it is too far away from where people live to be usable.

Less than 1% of all the water on earth is fresh water that we can actually use. We use this small amount of water for drinking, transportation, heating and cooling, industry, and many other purposes.

Fresh water : Fresh water is naturally occurring water on the Earth's surface in ice sheets, ice caps, glaciers, icebergs, bogs, ponds, lakes, riversand streams, and underground as groundwater in aquifers and underground streams. Fresh water is generally characterized by having low concentrations of dissolved salts and other total dissolved solids. For man and most of the living being, fresh water is only 2.6% of total water and the rest of the water is salty.

This potable fresh water for man obtained mainly by the following two sources.



Surface water

The water which is coming out directly through precipitation and does not percolate down into the ground or does not return to the atmosphere by evaporation is known as **surface water.**

OR

The water stored on the surface of earth is called surface water.

Standing water

Lake : A large area of water surrounded by land.

Reservoirs : These are generally larger then lakes.

Estuaries : Estuaries are the delta formed at the point of river when they join with ocean.

Flowing water

The water which originate from the point of precipitation and flow in streams and rivers are called **flowing water**. The flowing water carries sedimentary materials and dissolved minerals..

In south pole, about 95% part of Antarctica is covered with 2000 meters thick layer of the ice. The ice is a reserve store of 90% of water available on the whole earth. North polar region arctic is the largest snow covered arch. Large parts of the countries like Ice land, Alaska, Russia and Canada are covered with snow. The water reserve has also started getting affected by the environment polluted by man.

Due to global warming, the ice here has started melting. In addition to polar regions the water in pure form is available on the ice caps of high mountains, glaciers and ice bergs, which are the places of origin of rivers.

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Ground water

Groundwater is the water found underground in the cracks and spaces in soil, sand and rock. It is stored in and moves slowly through geologic formations of soil, sand and rocks called aquifers. Aquifers are typically made up of gravel, sand, sandstone, or fractured rock, like limestone. Water can move through these materials because they have large connected spaces that make them permeable. The speed at which groundwater flows depends on the size of the spaces in the soil or rock and how well the spaces are connected.

The ground water reservoir is called as "AQUIFER". Aquifers are not a part of the water cycle and present in underground rocks. This reserved water is used for making bores in these rocks by modern tube well system.

Components of water

Water is the combination of Oxygen and hydrogen.

Water is the basis of life. Water is an important component of the environment found in the form of water vapours, liquid or solid form.

The liquid form is more essential for living beings. The oceans and sea are main water bodies affect the climate. The accumulation of water artificially at a place is called a **"Reservoir".** The water available on the surface of earth are formed in three forms.

Surface water - lakes, rivers, ponds, canals etc.

Sea water - 71% of earth - Fresh, Petroleum, Pearls, Minerals substances.

Ground water - 15% of total water - Layers of rocks.

Consequences of overdrawing of ground water

- Decrease of the ground water level
- Ground subsidence i.e. if the withdrawal of ground water is more, than its recharge rate, sediments in the aquifer gets compact which results in sinking of overlaying land surface
- Lowering of water table.
- Intrusion of salt water from the sea
- · Earthquake, land slide and famine
- Drying up of wells
- Water pollution

Water conservation

We can live without food for some weeks but without water we would die within a few days. Daily activities depend upon sufficient supply of water (i.e) agriculture, Industry, generation of electricity, Internal transport, Hygiene of all public health services etc. Water conservation can be divided into three main parts.

- **Urban water conservation :** The minimum water should be used for washing purpose i,e for cleaning toilets and for other domestic uses.
- Industrial water conservation : It means that minimum water should be used for manufacturing of products.
- **Agricultural water conservation** : The basic meaning is that minimum amount of water should be used in agriculture.

Recommendations for water conservation

- By presenting salinity of fresh water to increase the availability of surface water in the earth.
- By maintaining the quality of surface water and resource.
- By ensuring better utilization of the present irrigation, advanced drainage system.
- By ensuring the fertility of soil through preservation of soil and humidity in it.
- By participation of the people in water conservation programmes.
- By minimum filling and use of waste water for vegetation.
- By using of drip irrigation and sprinkler irrigation in place of flooding.
- By adopting shallow rooted and deep rooted crops.
 (i.e) pigeon pea + maize, Indian mullet + wheat + grain
 + barley + mustard.
- By collection of rain water in ponds and water bodies.
- By scheduling the irrigation is helpful in the conservation of water.
- By stopping wastage of water and close the tap when not in use.
- By receiving the river water by shafting its path through making an embankment.
- By filling again the rain water in the dry wells.

The water can be conserved through the method of harvesting of rain water.

- A roof top rain water harvesting structure shall be made available in the urban areas for every 200 sq. metre plate.
- All the village ponds shall be renovated and put in use again.
- Construction of irrigation wells / tube wells should be prevented near the wells having less amount of water and within the diameter of 200 metres from them.

Necessity of water treatment

Water treatment is the process that makes the water to use for drinking, Industrial or medical etc. In water

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treatment process, the existing water contaminants to be removed or to reduce their concentration which makes the water to fit for its desired end use. It may be safely returning used water to the environment.

The process involved in treating water for drinking purpose are:

- Separation of solids by using physical processes such as Settling and Filtration
- By using chemical process such as Disinfection and Coagulation
- By using biological process such as aerated lagoons and activated slow sand filters

Purification of potable water

Water purification is the removal of containments from untreated water to produce drinking water which is pure enough for its intended uses for human consumption. The quality of water is not only related to the treatment of water, but also relate to its conveyance and distribution after treatment.

During the drinking water treatment process, the following substances are removed, which includes suspended solids, bacteria, algae, viruses, fungi and minerals (iron, manganese and sulphur and fertilizers)

World Health Organisation (WHO), guidelines are generally to be followed throughout the world for drinking water quality requirements.

Process for drinking water treatment

The following processes are used for drinking water treatment worldwide:

- "Pre-Chlorination" for algae control and arresting any biological growth.
- "Aeration" along with pre-chlorination for removal of dissolved iron and manganese
- Coagulation for flocculation
- Coagulant aids (poly electrolytes)
- To improve coagulation and for thicker floc formation
- Sedimentation for solids separation, (i.e) trapped in the floc.
- Filtration removing particles from water.
- Desalination process of removing salt from the water.
- Disinfection for killing bacteria.

Sewage treatment

Sewage treatment is the process that removes the majority of the contamination from the waste water (or) sewage and produces both a liquid effluent suitable for disposal to the natural environment and a sludge.

Sewage must be conveyed to a treatment plant by pipes and infrastructure with regulation and controls. At the simplest level treatment of sewage and most waste water is carried out through separation of solids from liquids by sedimentation.

By converting dissolved material into solids, usually a biological floc, settled out an effluent stream of increasing purity is produced.

Industrial water treatment

There are two main processes of industrial water treatments. They are

- Boiler water treatment
- · Cooling water treatment

Steam boilers can suffer from scale or corrosion when left untreated leading to weak and dangerous machinery. For scale deposits additional fuel is required to heat the same level of water because of the drop in efficiency. Poor quality dirty water can become a breeding ground for bacteria such as 'legionella' carving a risk to public health. With the proper treatment, industrial on-site waste water might be reusable. This can save money in three ways.

- Lower charges for lower water consumption
- Lower charges for the smaller volume of effluent water discharged.
- Lower energy costs due to the recovery of heat in recycled waste water.

Corrosion in low pressure boilers can be caused by dissolved oxygen, acidity and excessive alkalinity levels.

Without effective water treatment a cooling water system can suffer from scale formation corrosion and fouling and may become a breeding ground for harmful bacteria such as those that cause legionaries disease. This reduces efficiency, shortens plant life and makes operations unreliable and unsafe.

Disinfectants of water treatment

Disinfectants

1 Ozone

When purifying water, the main and very strong **disinfectant** is **'ozone'**. It breaks down in the water complex chain reaction mechanisms occurs under the effect of the various solutes in the water released during purification treatment.

2 Ultraviolet (UV)

Ultra violet radiation produces a minimum of by products when treating the water.

- An Advanced Oxidation Process (AOP) is a system to purify water by chemical oxidation to deactivate residual organic pollutants. It is only gradually used in

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the water treatment industry. One of the many AOP systems, the combined O_3/H_2O_2 is the most widely used for the purpose of destroying pesticides in order to produce water for human consumption.

Water shed management

It is hydrological unit, process of ecology to establish the quality of soil and water resources in the watershed management. Watershed is an area of geographical limit and outlined area in the water resources. (e.g) A river or water reservoir from which water shed is made. This management means to direct and co-ordinate the use of the soil and water resources in the watershed.

Water shed programmes to develop dry land

- Improvement in collection of runoff water through harvesting system.
- By implementing advanced technologies increase the income and productivity from the dry land.
- To increase the opportunities of employment at village level.
- Conservation of soil resource to obtain continuous production.
- To increase agriculture production in train fed areas and to stabilize.

Rain water harvesting

Water is an essential resource for sustaining life and the environment. The storage of rain water means to essentially collect water on the roof of the buildings and then store it as ground water for using it later on.

- By storage of rain water, not only availability of water is increased but fall in water level can also be prevented.
- Even a drop of water should be saved and would ensure that water would not be wasted.
- · It is economical to store water
- It increases the quality of the ground water.
- It is a technique in the storage and use of rain water is locally done under the ground so that domestic needs could be satisfied.

Advantages

- · Increase in ground water in the wells
- The ability of sufficient water from the wells
- · To prevent fall in the level of water
- Decrease the dangers of flood and soil erosion.
- · Improvement in the quality of water.
- To prevent entry of sea water.
- To decrease the effects of draught.
- Effective use of lakhs of passive wells and tube wells in the form of recharge structures.
- Improvement in the social and environmental situation.

MODULE 4

LABOUR WELFARE LEGISLATION

Benefits Guaranteed under Various Act

Objectives : At the end of this lesson you shall be able to

- explain the need of Industrial Act
- state what is law
- state meaning of Act and rule.

Industrial Act: Generally the factory owners and industrialist are concerns with their profit only. They do not bother about welfare of their workers. They always want to spend less amount on their workers. To avoid expenditure they do not make any provisions for the welfare health and safety of their workers. Nor they compensate the workers who met with accidents while working in the factories or if they acquire some occupational diseases.

Many times, the factory owners deduct their salaries without any valid reason, some workers are denied wages for their work. So that the factory owners can exploit the workers in different ways.

In order to check the exploitation of workers by the factory or industrialist, to safeguard the interest of the workers the government of India has made certain laws.

This is called labour laws or industrial acts. In addition, labour courts have been set up by our government. (Fig 1)



The following are the main labour and industrial laws that have been enacted by the government of India.

- 1 Factory Act 1948
- 2 Workmens compensation Act 1923
- 3 Employees state insurance Act 1948
- 4 Payment of wage Act 1936
- 5 Minimum wage Act 1948
- 6 Employees provident fund Act 1952
- 7 Apprentice Act 1961 and many more.

Law: Law is rule of conduct or procedure established by custom, agreement, or authority. In other words it is the body of rules and principle governing the affairs of a society. Law constitutes Acts, Statues, Amendments, Notification, Rules, Bill in parliament.

Legislation that has been passed by both the house of parliament and has been approved by the president, then the law becomes an Act. In other words, the bill passed in parliament became Act.

Act: Act is the intention of law describing the applicability, definitions governing provisions and fine penalties and the way it is to be applied.

Rules: Rules are the standard methods and procedures in relation to any provision, contained in the act and these are framed by the inherent power given in the act.

Employability Skills - Labour Welfare Legislation

Factories Act 1948

Objectives : At the end of this lesson you shall be able to

- list the objectives of the Factories Act. 1948
- state when the Factories Act was enacted and enforced
- define occupier and Adult
- state the responsibilities of occupier
- brief the provisions of health and safety
- explain the welfare facilities under Factories Act 1948.

Objectives of the Factories Act 1948

- · to regulate the working condition in factories
- · to provide safety measures of workers in factories
- to protect health condition of worker in factories
- · to provide welfare of the workers in factories
- to penalise any violation of factory Act 1948.

The factories Act 1948 was passed by constituent Assembly on 28th August 1938, and came into force on 1st April 1949. The Act is applicable to whole of India except the state of Jammu and Kashmir.

Applicability

- There must be a premises & manufacturing process.
- 10 workers employed with power or 20 workers without power.

(**"Power"** means electrical energy, or any other form of energy which is mechanically transmitted and is not generated by human or animal agency)

Definition

Occupier : It means the person who has ultimate control over the affairs of the factory.

Adult : Who has completed his eighteenth year of age.

Hazardous Process : Unless special care is taken, raw material, Intermediate or final products, bye-products or wastes/effluents would cause impairment to health of persons engaged or pollute general environment.

Responsibilities of Occupier

- Shall ensure so far as reasonably practicable, the safety, health and welfare of all workers.
- Provide and maintain the plant and systems that are safe and without risks to health.
- Ensure safety and absence of risk to health while transport, storage and use of substances.
- Provide information, instruction, training, supervision to ensure safety and health.
- Provide and maintain all places of work, access safe and without risk.

- Work environment monitoring to be provided and maintained.
- Provide adequate facilities for welfare.
- Prepare safety policy and communicate to workers.

Registration & Grant of Licence

- Plans of a factory has to be approved by Chief Inspector of Factories.
- Occupier or manager of a factory has to apply for registration & get the licence from Chief Inspector of Factories.
- Licence so granted may be amended, renewed, revoked or suspended in accordance with the rules framed under the act.

Provisions on Health

Cleanliness

- Floor of every workplace to be cleaned at least once in a week by washing, using disinfectant, wherever necessary, or by other effective method.
- To provide & maintain effective means of drainage where the floor is likely to get wet & drained due to manufacturing process.
- Floors to be Painted with washable water paint must be repainted at least once in every period of 3 years and washed at least once in every period of six months.
- White washing at least once in every 14 months.
- Repainting or re-varnishing every 5 years.
- Disposal of trade wastes Proper disposal of wastes and effluent to be ensured.
- Ventilation: Ensure workplace has adequate ventilation.
- Comfortable temperature.
- Control of air pollution (dust & fumes).
- Overcrowding To avoid overcrowding, ensure 500 cubic feet of space for every worker.
- Ensure spittoons are provided at adequate places.
- Ensure uninterrupted supply of Drinking Water.

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• To provide sufficient number of Latrines and urinals - separate for gents and ladies

Provisions on Safety

Fencing of Machinery

Securely fence by safeguards of substantial construction, which shall be constantly maintained & kept in position

Striking Gear and Devices for Cutting Off Power

Suitable striking gear or other efficient mechanical appliance should be provided, maintained & used to move driving belts to & fro fast pulleys and loose pulleys which form a part of the transmission machinery. Such appliance / gear should be so constructed, placed & maintained as to prevent the belt from creeping back on to the fast pulley.

Hoists & lifts

In every factory hoist & lift should be -

- Of good mechanical construction, sound material & adequate strength.
- Properly maintained, and should be thoroughly examined by a competent person at least once in a period of every six months, and keep records of such examination in a prescribed register.

Floors, Stairs & Means of Escape

All floors, steps, stairs, passages and gangways should be of sound construction & properly maintained and should be kept free from obstructions and substances likely to cause persons to slip. Steps, stairs, passages and gangways shall be provided with substantial handrails wherever necessary to ensure safety

Pressure vessels: Plant, machinery or a part thereof operated at a pressure above atmospheric pressure are pressure vessels

- Certificate from the manufacturer to be maintained
- · Details are to be displayed on the vessel
- External examination to be carried out once in 6 months
- Internal examination once in 24 months
- Hydraulic test 4 years.

Welfare facility

Washing facility : In every factory, adequate and suitable facilities for washing should be provided and maintained for the use of the workers

Facilities for Sitting

Suitable arrangements for sitting should be provided and maintained for all workers obliged to work in standing position, in order that they can take advantage of any opportunities for rest which may occur during the course of their work

First Aid Appliances

Provide and maintain in readily accessible position during all working hours. One first aid box or cupboard equipped with prescribed contents for every 150 workers ordinarily employed at any one time in a factory.

- Shelters, rest rooms and lunch rooms when there are 150 or more workers.
- Canteens when there are 250 or more workers.
- Creches when there are 30 or more women workers.
- Welfare Officer when there are 500 or more workers.

Working hours, spread over & overtime for adults

- Weekly hours not more than 48 hours
- A worker must be given an interval of rest for at least half an hour after 5 hours of work
- The total period of work, inclusive of rest interval, must not be spread over more than 10 ½ hours a day
- Extra wages for overtime double than normal rate of wages
- Restrictions on employment of women before 6 AM and beyond 7 PM.
- A worker **can not** be employed for more than 48 hours in a week
- If a worker works for more than 9 hours a day or more than 48 hours a week, he shall be paid for overtime @ twice the regular wage
- A holiday must be given in every week
- Compensatory holidays in case of missing of weekly holiday

Annual Leave with Wages

- A worker having worked for 240 days @ one day for every 20 days
- Accumulation of leave for 30 days.

Special Provisions

- Power to apply the Act to certain premises
- Dangerous operations- special precautions
- Power to prohibit employing persons in case of serious hazard
- Notice of accidents and dangerous occurrences
- Notice of diseases
- Power to direct enquiry, sampling & surveys

Penalties

- General penalty for offences- Upto 2 years imprisonment / Rs.one lakh.
- Sec.41B,C, H Upto 7 years or Rs. Two lakhs
- Workers Upto Rs.500/-

Employability Skills - (NSQF) Labour Welfare Legislation : Theory 2.4.54

Apprentices Act

- **Objectives** : At the end of this lesson you shall be able to
- brief an overview of Apprentice Training Scheme
- state the need for Apprentices Act
- list the objectives of Apprentices Act
- mention the stipend amount for each apprentices
- list duties and responsibilities of the implementation authorities.

An overview of Apprenticeship Training Scheme (ATS)

Apprentices Act was enacted in 1961 for training trade apprentices. It was amended in 1973 to include Engineering Graduates and diploma holders. In 1986, it was further amended to cover Vocational courses. The Apprenticeship Rules was amended in 1992.

At present, it encompasses 243 trades in 35 trade groups in respect of Trade Apprentices.

Need for Apprentice Act

- Development of human resource is crucial for the industrial development of any nation. Upgradation of skills is an important component of Human Resource Department (HRD). Training imparted in Institutions alone is not sufficient for acquisition of skills and needs to be supplemented by training in the actual work place.
- Apprentices Act 1961 was enacted with the following objectives.

Objectives

- To regulate the programme of training of apprentices in the Industry so as to confirm to the prescribed syllabi, period of training, etc... as laid down by the Central Apprenticeship Council
- To utilize fully the facilities available in Industry for imparting practical training with a view to meet the requirements of skilled manpower for industry.

Monitoring of the implementation of the Act.

- DGET is responsible for implementation of the Act in respect of Trade Apprentices in the Central Government undertakings and Departments. This is down through six Regional Directorate of Apprenticeship Training located at Chennai. Hyderabad, Mumbai, Kanpur, Faridabad and Kolkata.
- State Apprenticeship Advisers are responsible for implementation of the Act in respect of Trade Apprentices in State Government Undertakings / Departments and Private Establishments.
- Department of Education in the Ministry of HRD is responsible for implementation of Act in respect of Graduate, Technician and Technician (Vocational) Apprentices. This is done through four Boards of Apprenticeship Training located at Chennai, Mumbai, Kanpur and Kolkata.

Central Apprenticeship council (CAC)

- It is an apex statutory body. It advises the Government on laying down policies and prescribing norms and standards in respect of Apprenticeship Training Scheme (ATS)
- It is a tripartite by constitution with members from Government both Central and State /UT's, Employers and Trade Unions.
- Union Labour Minister is the Chairman and Minister of state for education in the union ministry of HRD is the Vice Chairman.

Stipend

• Trade apprentices are paid stipend at following rates for

1st year Rs. 2100/- p.m 2nd year, Rs. 2400/- p.m 3rd year Rs. 2800/- p.m

- 4th year Rs. 3100/- p.m.
- The expenditure on stipend for trade apprentices is borne by the employers.
- The rates of stipend for
 - (a) Graduate Engineer, Rs. 3560/- p.m.,
 - (b) Graduate Engineer, (SW) Rs. 2530/- p.m.,
 - (c) Technician Diploma holder Rs. 2530/- p.m.,
 - (d) Technician Diploma (Sandwich course) Rs. 2070/- p.m

(e) Technician (Vocational) apprentices is shared equality between the employer and the Central Government.

• Rates of stipend are revised every two years based on Consumer Price Index.

Training of trade apprentices

- 243 trades in 35 trade groups and informal sector have been designated
- Qualification vary from Class VIII pass to XII class pass (10+2) system and in few cases B.Sc.
- Minimum age is 14 years.
- Period of training varies from 6 months to 4 years.

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- Apprenticeship training is linked with craftsmen training scheme conducted in Industrial Training Institutes (ITIs / ITCs). Rebate in period of Apprenticeship Training is allowed to pass outs from ITIs in relevant trades.
- Training comprises of basic training practical training and related instructions as per prescribed syllabus for each trade.
- Basic training & related instructions are conducted in basic training centres (BTCs) set up within the establishment for fresher's.
- Seats for trade apprentices are located by the Apprenticeship Advisor on the basis of prescribed ratio of Apprentices to Workers and availability of training facilities.
- Engagement of trade apprentices is done twice in a year (March and September).
- Every apprentice and employer has to enter into a contract of apprenticeship training, which is registered by apprenticeship advisors.
- Employers and apprentices have to fulfil their obligations under the Act.

Trade testing and certification of trade apprentices

- All India Trade Test for apprentices are conducted twice in a year i.e. April / May and October / November.
- The recruitment session for apprentices is March and September every year. However the establishments are allowed to recruit trade apprentices upto 15th of April and 15th of October every year. Accordingly the apprentices completing apprenticeship training as on 15th of October and 15th of April will be eligible for examination.
- Successful candidates are eligible for National Apprenticeship Certificate (NAC).
- Best Apprentices are awarded Merit Certificates for the winner and runner up.
- Best establishment is given Award (Merit Certificates).

Skill competition of trade apprentices

- With a view of fostering healthy competition among apprentices as well as establishments, skill competition is organised at local, regional and all India levels. Regional skill competition and all India skill competition are conducted in the following trades.
- 1 Fitter
- 2 Turner
- 3 Machinist
- 4 Welder (Gas & Electric)
- 5 Electrician
- 6 Mechanic Motor Vehicle
- 7 Instrument Mechanic

- 8 Electronic Mechanic
- 9 Draughtsman (Mechanical)
- 10 Wireman
- 11 Mechanic Diesel
- 12 Tool & Die Maker (Dies & Moulds)
- 13 Tool & Die Maker (Press Tools, Jigs & Fixtures)
- 14 Refrigeration & Air-conditioning Mechanic
- 15 Millwright maintenance mechanic renamed as Mechanic Machine Tool Maintenance

General

- This Regional Directorate of Apprenticeship Training (RDAT), Chennai is responsible for implementing the apprentices Act 1961 in respect of Trade Apprentices in the Central sector Establishments / Departments / Offices situated in the states of Tamilnadu, Kerala, Pondicherry and Union Territory of Lakshadweep.
- It is also engaged in monitoring of implementation of apprentices act in respect of trade apprentices in state public sector / Departments and private sector establishments coming under the purview of the state apprenticeship advisors of the above states.

Survey / Re-survey of establishments

- This directorate conducts survey of Central Establishments to assess the training facility and issues notification under the apprentices act on the quota of trade apprentices to be trained in different trades in these establishments.
- It also conducts re-survey of Central Establishments, already covered under Apprentices Act, at regular intervals to assess the training facility and issue revised quota notification.

Monitoring of implementation

 This directorate monitors implementation of apprentices act in the notified establishments by obtaining monthly and other periodical returns and undertakes corrective measures.

Registration of contract

• The contract entered into by the apprentices and the employers are scrutinized and registered by this directorate, as contained under the apprentices Act 1961.

Progressive trade test (PTT)

 The officers of this directorate conducted PTT for the apprentices engaged by the establishments at regular intervals to ensure the quality of training imparted to the apprentices.

Inspection of central sector establishments

 The officers of this directorate conducts inspection of notified central sector establishment at regular intervals and ensure that the apprenticeship Training Programme is being carried out by the establishments as prescribed in the Act.

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All India Trade Test for Apprentices

- The All India Trade Tests for Apprentices under the aegis of NCVT are conducted during April / May and October / November every year. This Directorate scrutinizes the eligibility and permits the apprentices to appear in these tests.
- It allows the failed candidates to appear as supplementary for these trade tests. Further, it also permits candidates to appear for the All India Trade Test as a private candidate.
- It assesses and indents question papers from DGE&T (HQ) and distributes to the Trade Testing Centre's.
- It approves the list of Chairman / Local Board of Examination and examiners for the Trade Testing Center's.
- It scrutinizes the results received from various centres and declares result.
- It issues National Apprenticeship Certificates (NAC) to the successful apprentices.
- It reimburses honorarium to the Chairman / Local Board of Examination, Examiners and invigilators.
- It reimburses the Raw material charges to the various Trade Testing Centre's.
- It issues Duplicate Certificates and also authenticates Certificates as and when such references are received.
- It select Apprentices for Regional Skill Competition.

Data Bank

 This Directorate maintains a data bank of candidates who would like to undergo trade apprenticeship training and sponsors the list to Establishments on their request.

Inspection of establisments Coming under state apprenticeship advisors

• The power of central apprenticeship advisor to inspect the state sector / private sector establishment coming under the state apprenticeship advisors are delegated to the directorate for the state in that region. The officers of this directorate inspect these establishments at regular intervals under apprentices Act. 1961

Regional Apprenticeship Advisory Committee (RAAC)

• This directorate convenes the RAAC in the Region for review and monitoring of apprenticeship training scheme in this region.

Identifying the private establishments not covered under the Act.

 As a proactive measure, it identifies the private sector establishments not covered under the Apprentices Act and brings it to the notice of the concerned state Apprenticeship Advisors for taking necessary action to bring them under the Apprentices Act 1961. The directorate is engaged in identifying the establishments where the informal sector trades could be introduced and brings to the notice of SAA to bring them under the Act.

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Employees State Insurance (ESI) Act

Objectives : At the end of this lesson you shall be able to

- describe the objectives of the act
- state the applicability of the act
- state the benefits of the act.

Introduction

The Employee State Insurance Act, [ESI] 1948, is a piece of social welfare legislation enacted primarily with the object of providing certain benefits to employees in case of sickness, maternity and employment injury and also to make provision for certain others matters incidental thereto.

The Act in factories to attain the goal of socio economic justice enshrined in the Directive principles of state policy under part 4 of our constitution, in particular articles 41, 42 and 43 which enjoin the state to make effective provision for securing, the right to work, to education and public assistance in cases of unemployment, old age, sickness and disablement. The act strives to materialize these declared objects through only to a limited extent.

This act becomes a wider spectrum than factory act. In the sense that while the factory act concerns with the health, safety, welfare, leave etc. of the workers employed in the factory premises only.

But the benefits of this act extend to employees whether working inside the factory or establishment or elsewhere or they are directly employed by the principal employee or through an intermediate agency, if the employment is incidental or in connection with the factory or establishment.

Objectives

The ESI Act is a social welfare legislation enacted with the object of providing certain benefits to employees in case of sickness, maternity and employment injury. Under the Act, employees will receive medical relief, cash benefits, maternity benefits, pension to dependents of deceased workers and compensation for fatal or other injuries and diseases.

Applicability

- The ESI Act extends to the whole of India.
- It applies to all the factories including Government factories (excluding seasonal factories), which employ 10 or more employees and carry on a manufacturing process with the aid of power and 20 employees where manufacturing process is carried out without the aid of power.
- The act also applies to shops and establishments. Generally, shops and establishments employing more than 20 employees are covered by the Act. "Shop" according to the Delhi Shops and Establishment Act, 1954 means any premises where goods are sold either by retail or wholesale or where services

are rendered to customers, and includes an office, a storeroom, godown, warehouse or workhouse or work place, whether in the same premises or otherwise, used in or in connection with such trade or business but does not include a factory or a commercial establishment.

"Establishment" means a shop, a commercial establishment, residential hotel, restaurant, eatinghouse, theatre or other places of public amusement or entertainment to which this Act applies and includes such other establishment as Government may, by notification in the Official Gazette, declare to be an establishment for the purpose of this Act.

According to the Delhi Shops and Establishment Act, 1954, "Commercial Establishment" means any premises wherein any trade, business or profession or any work in connection with, or incidental or ancillary thereto is carried on and includes a society registered under the Societies Registration Act, 1860, and charitable or other trust, whether registered or not, which carries on any business, trade or profession or work in connection with, or incidental or ancillary thereto, journalistic and printing establishments, contractors and auditors establishments, quarries and mines not governed by the Mines Act, 1952, educational or other institutions run for private gain, and premises in which business of banking, insurance, stocks and shares, brokerage or produce exchange is carried on, but does not include a shop or a factory registered under the Factories Act, 1948, or theatres, cinemas. restaurants, eating houses, residential hotels, clubs or other places of public amusements or entertainment. Form 01 - Employers' Registration Form also requires a copy of the registration certificate or licence obtained under the Shops and Establishment Act to be attached along with this form. From this it is guite evident that ESI Act will be applicable to shops and establishments. Again the definition of shops and establishment will vary from state to state depending on the shops and establishment act of that particular state

- The act does not apply to any member of Indian Naval, Military or Air Forces.
- All employees including casual, temporary or contract employees drawing wages less than Rs 10,000 per month are covered. The ceiling limit has been raised from Rs.7500 to Rs.10000 with effect from 01.10.06.

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- Apprentices covered under the Apprenticeship Act are not covered under this Act. According to Apprenticeship Act 1961, "apprentice" means a person who is undergoing apprenticeship training in pursuance of a contract of apprenticeship.
- The apprentices under any scheme as the name suggests come to learn the tricks of the trade and may not count much so far as the output of the factory is concerned, with that end in view, the apprentices are exempted from the operation of laws relating to labour unless the State Government thought otherwise.
- A factory or establishment, to which this Act applies, shall continue to be governed by its provisions even if the number of workers employed falls below the specified limit or the manufacturing process therein ceases to be carried on with the aid of power subsequently.
- Where a workman is covered under the ESI scheme,
 - Compensation under the Workmen's Compensation Act cannot be claimed in respect of employment injury.
 - No benefits can be claimed under the Maternity Benefits Act

Areas Covered

The ESI Scheme is being implemented areawise by stages. The Scheme is being implemented in almost all union territories and states except Nagaland, Manipur, Tripura, Sikkim, Arunachal Pradesh and Mizoram.

Administration of the Act

The provisions of the Act are administered by the Employees State Insurance Corporation. It comprises members representing employees, employers, the central and state government, besides, representatives of parliament and medical profession. A standing committee constituted from amongst the members of the corporation, acts as an executive body. The medical benefit council, constituted by the central government, is another statutory body that advises the corporation on matters regarding administration of medical benefit, the certification for purposes of the grant of benefits and other connected matters.

Registration

The employer should get his factory or establishment registered with the ESI Corporation within 15 days after the Act becomes applicable to it and also obtain the employer's code number. Application should be made in Form 01 and after having being satisfied with the application form, the regional office will allot a code number to the employer, which must be quoted in all documents and correspondence.

Identity Card

An employee is required to file a declaration form upon employment in factory or establishment to show that he is covered under the Act.

Benefits under the Scheme

Employees covered under the scheme are entitled to medical facilities for self and dependants. They are also entitled to cash benefits in the event of specified contingencies resulting in loss of wages or earning capacity. The insured women are entitled to maternity benefit for confinement. Where death of an insured employee occurs due to employment injury or occupational disease, the dependants are entitled to family pension. Various benefits that the insured employees and their dependants are entitled to, the duration of benefits and contributory conditions thereof are as under:

Medical benefits

- From day one of entering insurable employment for self and dependants such as spouse, parents and children own or adopted.
- For self and spouse on superannuation subject to having completed five years in insurable employment on superannuation or in case of having suffered permanent physical disablement during the course of insurable employment.

Sickness benefits

- Sickness benefit is payable to an insured person in cash, in the event of sickness resulting in absence from work and duly certified by an authorised insurable medical officer/ practitioner.
- The benefit becomes admissible only after an insured has paid contribution for at least 78 days in a contribution period of 6 months.
- Sickness benefit is payable for a maximum of 91 days in two consecutive contribution period.

Extended sickness benefit

- Extended sickness benefit is payable to insured persons for the period of certified sickness in case of specified 34 longterm diseases that needs prolonged treatment and absence from work on medical advice.
- For entitlement to this benefit an insured person should have been in insurable employment for at least 2 years. He/ she should also have paid contribution for a minimum of 156 days in the preceding 4 contribution periods or say 2 years.
- ESI is payable for a maximum period of 2 years on the basis of proper medical certification and authentication by the designated authority.
- Amount payable in cash as extended sickness benefit is payable within 7 days following the submission of complete claim papers at the local office concerned.

Employability Skills - (NSQF) Labour Welfare Legislation : Theory 2.4.56

Enhanced sickness benefit

- This cash benefit is payable to insured persons in the productive age group for undergoing sterilization operation, viz., vasectomy/ tubectomy.
- The contribution is the same as for the normal sickness benefit.
- Enhanced sickness benefit is payable for 14 days for tubectomy and for seven days in case of vasectomy.

Maternity benefit

- Maternity benefit is payable to insured women in case of confinement or miscarriage or sickness related thereto.
- For claiming this, an insured woman should have paid for at least 70 days in 2 consecutive contribution periods i.e. 1 year.
- The benefit is normally payable for 12 weeks, which can be further extended up to 16 weeks on medical grounds.
- The rate of payment of the benefit is equal to wage or double the standard sickness benefit rate.
- The benefit is payable within 14 days of duly authenticated claim papers.

Disablement benefit

- Disablement benefit is payable to insured employees suffering from physical disablement due to employment injury or occupation disease.

Dependants benefit

- Dependants benefit [family pension] is payable to dependants of a deceased insured person where death occurs due to employment or occupational disease.
- A widow can receive this benefit on a monthly basis for life or till remarriage.
- A son or daughter can receive this benefit till 18 years of age.
- Other dependants like parents including a widowed mother can also receive the benefit under certain condition.
- The rate of payment is about 70% of the wages, shareable among dependants in a fixed ratio.
- The first instalment is payable within a maximum of 3 months following the death of an insured person and thereafter, on a regular monthly basis.

 Other benefits like funeral expenses, vocational rehabilitation, free supply of physical aids and appliances, preventive health care and medical bonus.

Obligations of Employers

- The employer should get his factory or establishments registered with the E.S.I. Corporation within 15 days after the Act becomes applicable to it, and obtain the employers Code Number.
- The employer should obtain the declaration form from the employees covered under the Act and submit the same along with the return of declaration forms, to the E.S.I. Office. He should arrange for the allotment of Insurance Numbers to the employees and their Identity Cards.
- The employer should deposit the employees' and his own contributions to the E.S.I. Account in the prescribed manner, whether he has sufficient resources or not, his liability under the Act cannot be disputed. He cannot justify nonpayment of E.S.I. contribution due to non availability of finance.
- The employer should furnish a Return of Contribution along with the challans of monthly payment, within 30 days of the end of each contribution period.
- The employer should not reduce the wages of an employee on account of the contribution payable by him (employer).
- The employer should bound to maintain the prescribed records/registers namely the register of employees, the inspection book and the accident book.
- The employer should report to the E.S.I. authorities of any accident in the place of employment, within 24 hours or immediately in case of serious or fatal accidents. He should make arrangements for first aid and transportation of the employee to the hospital. He should also furnish to the authorities such further information and particulars of an accident as may be required.
- The employer should inform the local office and the nearest E.S.I. dispensary/hospital, in case of death of any employee, immediately.
- The employer must not put to work, any sick employee and allow him to take leave, if he has been submitted the prescribed certificate.
- The employer should not dismiss or discharge any employee during the period he/she is in receipt of sickness/ maternity/ temporary disablement benefit, or is under medical treatment, or is absent from work as a result of illness duly certified or due to pregnancy or confinement.

Employability Skills - (NSQF) Labour Welfare Legislation : Theory 2.4.56

	ESI Scheme - a total social security for workmen			
1	Medical care	Primary, Secondary and Tertiary medical care with no cash individual expenditure		
2	Sickness benefit	91 days		
3	Extended sickness benefit	730 days (upto 2 years) for specified 34 diseases.		
4	Maternity benefit	84 days +1 month (due to complications arising of pregnancy, confinement, premature birth of child etc.		
5	Permanent disablement benefit/ Temporary disablement benefit	Based on loss of earning capacity/as long as the disability lasts.		
6	Dependant's benefit	On the death of IP to the wife till she is alive/remarried and to family members as per conditions w.r.t. age/marriage		
7	Rajiv Gandhi Shramik Kalyan Yojna (Unemployment allowance)	50% of daily average wages upto 12 months unemployment on account of closure of factories, retrenchment or permanent invalidity of not less than 40% arising out of employment injury.		
8	Incentive scheme to employers for employing persons with disabilities	The employment share of contribution is paid by government for 3 years for providing employment to persons with disabilities drawing monthly wages upto Rs. 25,000/-		
9	Medical care to retired IPs	Medical facility available within ESIC on payment Rs.120/- per annum		

Payment of Wage Act 1936

Objectives : At the end of this lesson you shall be able to

- describe the need for enacting the payment wage Act
- state the objectives and scope of wage Act
- list the various industries / factory comes under payment wage Act
- brief the meaning of wages
- state the responsibility for payment of wages.

Need for enacting the payment wage Act

The payment of wages is the most important thing for a worker. Unless his wages is paid in time and without any undue deduction, he will feel disturbed and lose interest in the work. It may become difficult for him to survive. Therefore, it is felt necessary that there should be a law to protect the wage earned by a works. Keeping this in view the government of India enacted the payment of wage Act in 23rd April 1936.

Objective and scope of payment of wage Act

To regulate the payment of wages to certain classes of persons employed in the industry. The employed persons shall be paid their wages in a particular form and at regular intervals without any unauthorised deductions.

Application of the Act

The Act will apply to persons employed in any factory or employed (otherwise than in a factory) upon any railway by a railway administration or, either directly or through a subcontractor, by a person fulfilling a contract with a railway administration, and to persons employed in an industrial or other establishment.

Here "factory" means a factory as defined in section 2(m) of the Factories Act, 1948 (63 of 1948) and includes any place to which the provisions of that Act have been applied under section 85(1) thereof.

"Industrial or other establishment" means any

- a) Tramway service, or motor transport service engaged in carrying passengers or goods or both by road for hire or reward.
- b) Air transport service other than such service belonging to, or exclusively employed in the military, naval or air forces of the Union or the Civil Aviation Department of the Government of India.
- c) Dock, Wharf or Jetty.
- d) Inland vessel, mechanically propelled.
- e) Mine, Quarry or Oilfield.
- f) Plantation.
- g) Workshop or other establishment in which articles are produced, adapted or manufactured, with a view to their use, transport or sale.
- h) Establishment in which any work relating to the construction, development or maintenance of buildings, roads, bridges or canals, or relating to

operations connected with navigation, irrigation, or to the supply of water or relating to the generation, transmission and distribution of electricity or any other form of power is being carried on.

This Act applies to wages payable to an employed person in respect of a wage period. If such wages for that wage period **do not exceed Rs 6500/ per month** or such other higher sum which, on the basis of figures of the Consumer Expenditure Survey published by the National Sample Survey Organisation, the Central Government may, after every five years, by notification in the Official Gazette, specify."

Meaning of wages

"Wages" means all remuneration (whether by way of salary, allowances, or otherwise) expressed in terms of money or capable of being so expressed which would, if the terms of employment, express or implied, were fulfilled, be payable to a person employed in respect of his employment or of work done in such employment, and includes

- a) Any remuneration payable under any award or settlement between the parties or order of a court.
- Any remuneration to which the person employed is entitled in respect of overtime work or holidays or any leave period.
- c) Any additional remuneration payable under the terms of employment (whether called a bonus or by any other name).
- d) Any sum which by reason of the termination of employment of the person employed is payable under any law, contract or instrument which provides for the payment of such sum, whether with or without deductions, but does not provide for the time within which the payment is to be made.
- e) Any sum to which the person employed is entitled under any scheme framed under any law for the time being in force.

But does not include

 any **bonus** (whether under a scheme of profit sharing or otherwise) which does not form part of the remuneration payable under the terms of employment or which is not payable under any award or settlement between the parties or order of a court.

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- the value of any house/accommodation, or of the supply of light, water, medical attendance or other amenity or of any service excluded from the computation of wages by a general or special order of the State Government.
- 3) Any contribution paid by the employer to **any pension** or **provident fund**, and the interest which may have accrued thereon.
- 4) Any **travelling allowance** or the value of any travelling concession.
- 5) Any sum paid to the employed person to defray **special expenses** entailed on him by the nature of his employment. or
- 6) Any sum as **gratuity payable** on the termination of employment in cases other than those specified in subclause (d).

Responsibility for Payment of wages

Every employer shall be responsible for the payment of all wages required to be paid under this Act to persons employed by him and in case of persons employed,

- a) In factories, if a person has been named as the manager of the factory under clause (f) of subsection (1) of section 7 of the Factories Act, 1948 (63 of 1948).
- b) In industrial or other establishments, if there is a person responsible to the employer for the supervision and control of the industrial or other establishments.
- c) Upon railways (other than in factories), if the employer is the railway administration and the railway administration has nominated a person in this behalf for the local area concerned.
- d) In the case of contractor, a person designated by such contractor who is directly under his charge.
- e) In any other case, a person designated by the employer as a person responsible for complying with the provisions of the Act, the person so named, the person responsible to the employer, the person so nominated or the person so designated, as the case may be, shall be responsible for such payment.

It shall be the responsibility of the employer to make payment of all wages required to be made under this Act in case the contractor or the person designated by the employer fails to make such payment.

Wage period for payment of wages

The person responsible for payment of wages shall decide the wage period. But the period shall not exceed one month.

The wages of every person employed upon or in any railway, factory or industrial or other establishment upon or in which less than **1000 persons** are employed, shall be paid before the expiry of the 7th day after the last day of the wageperiod in respect of which the wages are payable.

Any other railway, factory or industrial or other establishment that is where more than 1000 people are employed, shall be paid before the expiry of the 10th day, after the last day of the wageperiod in respect of which the wages are payable.

In the case of persons employed on a dock, wharf or jetty or in a mine, the balance of wages found due on completion of the final tonnage account of the ship or wagons loaded or unloaded, as the case may be, shall be paid before the expiry of the **7**th **day from the day** of such completion.

Where the employment of any person is terminated by or on behalf of the employer, the wages, earned by him shall be paid before the expiry of the **2nd working day** from the day on which his employment is terminated.

But where the employment of any person in an establishment is terminated due to the closure of the establishment for any reason other than a weekly or other recognized holiday, the wages earned by him shall be paid before the expiry of the 2^{nd} day from the day on which his employment is so terminated.

Payment in case of death of the employed person whose wages are not disbursed

Where the amount payable to an employed person as wages could not be paid on account of his death before payment or on account of his whereabouts not being known;

- a) Be paid to the person **nominated by him** in this behalf.
- b) Where no such nomination has been made or where for any reasons such **amount cannot be paid** to the person nominated, be deposited with the prescribed authority.

Minimum Wages Act & Rules

Objectives : At the end of this lesson you shall be able to

- describe the minimum wages Act
- list the employer's checklist for minimum wages.

Introduction of minimum wages Act

The concept of **Minimum Wages** was first evolved by ILO in 1928 with reference to remuneration of workers in those industries where, the level of wages was substantially low and the labour was vulnerable to exploitation, being not well organised and having less effective bargaining power.

The need for a legislation for fixation of minimum wages in India received boost after World War – II when a draft bill was considered by the Indian Labour Conference in 1945. On the recommendation of the 8th Standing Labour Committee, the Minimum Wages Bill was introduced in the Central Legislative assembly on 11.4.1946 to provide for fixation of minimum wages in certain employments.

The Minimum Wages Bill was passed by the Indian Dominion Legislature and came into force on 15th March, 1948. Under the Act both State and Central Government are "Appropriate Governments" for fixation/revision of minimum rates of wages for employments covered by the Schedule to the Act.

The minimum rates of wages also include Special Allowance (Variable Dearness Allowance) linked to Consumer Price Index Number which are revised twice a year effective from April and October. The rates of wages once fixed are revised at an interval not exceeding of five years.

Employer's Checklist for Minimum Wages

The employer must pay every employee wages as fixed by the Government.

- a Wages must be paid in cash.
- b For the fixation of minimum wages, the employment must have been in Schedule originally or added to the Schedule by a notification under Section 27 of the Act.
- c The employer can take actual work on any **day up to 9 hours in a 12 hours shift,** but he must pay double the rate for any hour or part of an hour of actual work in excess of 9 hours or for more than 48 hours in any week.
- d Once a minimum wage is fixed according to the provisions of the Act, the employer must pay to every employee engaged in a Scheduled employment, minimum wages notification for that class of employees.

- e The employer should fix wageperiod for the payment of wages at intervals **not exceeding one month** or such other larger period as may be prescribed.
- f The employer should pay wages on a working day within seven days of the end of wage period or **within 10 days** if 1000 or more persons are employed in an establishment.
- g The employer should pay the wages to a person discharged **not later than the second working day** after his discharge.
- h Every employer should maintain a register of wages at workplace specifying the following particulars for each wage period in respect of each employed person:
 - a) Minimum rate of wages payable.
 - b) The number of days in which overtime was worked.
 - c) The gross wages.
 - d) The wages actually paid and the date of payment.
- i Every employer should get the signature or the thumb impression of every person employed on the wage book and the wage slips.
- j The employer should exhibit at main entrance to the establishment and its offices, a notice in respect of the following in English and local language.
 - i) Minimum rates of wages.
 - ii) Abstracts of the Acts and rules made there under.
 - iii) Name and address of the Labour Inspector/ Asst. Commissioner of Labour etc.

The minimum wages covers all workers in the sectors agricultural, industrial and smallscale sectors.

This means:

- farm labourers
- landless labourers
- factory workers
- · people working in cottage industries
- Construction workers etc.

The enactment of the Minimum Wages Act in 1948 is a landmark in the labour history of India. The Act provides for fixation of minimum wages for notified scheduled employment.

Theory 2.4.58

The Act aims to prevent sweating or exploitation of labour (According to the NSSO (2004-05) 61st round, around 395 million workers (86%) out of the total workforce of around 457 million workers constitute the unorganized/ informal sector. In fact 7% of those employed in organized sector has been identified as informal workers raising the toll of informal sector to 422 million (92%) through payment of low wages by ensuring a minimum subsistence wage for workers. The Act also requires the appropriate government (both at Centre and States) to fix minimum rates of wages in respect of employments specified in the schedule and also review and revise the same at intervals **not exceeding five years.**

Currently, the number of scheduled employments in the Central sphere is 45 whereas in the States sphere the number is 1650 (when all states are counted). With effect from November 2009, the National Floor Level of Minimum Wage has been increased to **Rs. 100 per day from Rs. 80 per day** (which was in effect since 2007). Recently with effect from April 1, 2011 the National Floor Level of Minimum Wage has been raised to **Rs. 115 per day.**

To protect the wages against inflation they were linked to rise in the Consumer Price Index.

The Variable Dearness Allowance (VDA) came into being in 1991 and the allowance is revised **twice a year**.

Fixation of Minimum Wage Rate in India:

Minimum rate of the wages fixed or revised consists of the following:

- A basic rate of wages and a special allowance, viz., cost of living allowance.
- A basic rate of wages with or without cost of living allowance and cash value of concessions for supplies of essential commodities.
- An all-inclusive rate, i.e. basic rate, cost of living allowance and cash value of concessions.

The Government may fix the minimum rates of wages either by the hour, by the day, by the month or by such wage period as may be prescribed. The minimum wage rate may be fixed at

- a) Time rate,
- b) Piece rate,
- c) Guaranteed time rate
- d) Overtime rate.

The Act provides that different minimum wage rate may be fixed for

- a) Different scheduled employments,
- b) Different works in the same employment,
- c) Adult, adolescent and children,
- d) Different locations or
- e) Male and Female.

Also, such minimum wage may be fixed by

- a) An hour,
- b) Day,
- c) Month, or
- d) Any other period as may be prescribed by the notified authority.

Cost of Living Allowance:

The minimum basic wages fixed are linked to consumer price index as a counter measure against inflation. The cost of living is set twice in a year. The Commissioner of Labour notifies the rate 1st of April and 1st of October. The rates are fixed on the basis of the average rise in the State industrial workers consumer price index numbers for half year ending December and June respectively.

Variable Dearness Allowance (VDA):

Dearness Allowance is payable to monthly, daily and piece rate earners. Every six months the respective State Governments issues the Cost of Living Index number for each and every scheduled employment.

Theory 2.4.59

Employees Provident Fund Act (EPF)

Objectives : At the end of this lesson you shall be able to

- describe the employees provident fund Act
- state the rules & regulations of the Act.

EPF Act 1952

The EPF act in India also known as the EPF act 1952 or the Employees' Provident Fund Scheme 1952 is a provision for securing the right- to work, education, unemployment, old age, sickness & disablement needs to be made by every state in India.

To secure the wellbeing of the employees in times of distress, the EPF act in India was formulated. The Employees' provident fund scheme or the EPF act 1952 which is the official EPF act in India takes care of following needs of the members:

- Retirement
- Medical Care
- Housing
- · Family obligation
- Education of Children
- Financing of Insurance Polices

EPF Rules and Regulations

- PF contribution is mandatory for those who have a basic salary of up to Rs. 6500. Contributions are voluntary for those whose basic salary exceeds Rs. 6,500.
- As per the rules, 12% of the basic salary which will include basic DA allowances that are ordinarily, necessarily and uniformly paid to employees will form the employee's contribution. For example, suppose your monthly salary particulars are as follows - basic: Rs. 30,000 p.m., conveyance allowance: Rs. 5,000 p.m., medical allowance: Rs. 5,000 p.m. So, as per the rules, an amount of 12 per cent on basic allowances (Rs. 40,000), i.e., Rs. 4,800 would form the employee's contribution.
- One can withdraw from his PF account on the account of his children's education, marriage of self, children and siblings, purchase/construction of a house, or any medical emergencies. However, withdrawal is subject to certain conditions:
 - Should have completed minimum seven years of service
 - Withdrawal can be made only three times in the period during which one holds the EPF account, and the maximum aggregate withdrawal would be 50 per cent of the total contributions made.

- For medical emergencies, there is no minimum service period. However, the maximum amount one can withdraw is six times the basic salary and proof of hospitalization is required.
- Withdrawal from EPF account for purchase/ construction of a house is available only once in an individual's entire working life. The minimum service period is five years and the maximum withdrawal amount is 36 times your total salary (for construction of property) and 24 times (for purchase of property).
- If a person wants he can contribute more than 12 percent towards his PF. The additional contribution is known as voluntary contribution. But such additional contribution will not be matched by the employer. All the same rules and interest rate will apply to the voluntary contribution regarding withdrawal, transfer, interest rate, etc.
- The Central government revises EPF interest rates every year depending upon the revenues made by EPFO on its previous years' deposits. For FY13, the EPF interest rate is 8.50 per cent.

EPF Rules for Withdrawal & Transfer

The following are the EPF rules for withdrawal and transfer:

A provident fund member can withdraw complete amount from the fund once he attains the age of 55. Cases where withdrawal can be possible before attaining age of 55 are:

- 1 At the time of Termination of service
- 2 Retirement on account of total disablement
- 3 Migration to other countries for permanent settlement
- 4 Retrenchment

A member can withdraw upto 90% of the amount of provident fund after attaining the age of 54 and before 55 or actual retirement on superannuation whichever is earlier. This claim can be done by submitting form 19 to the concerned EPF.

In cases of withdrawal from accounts of deceased members, the provident fund can be withdrawn by legal heirs by submitting form 20 to the concerned EPF

One can also do the Transfer of Provident Fund account from one region to other, from Exempted Provident Fund Trust to non-exempted Fund in a region and vice-by filing application for form 13 to the concerned EPF.

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Annual statements of account are sent to each organization once the account for the year is closed. EPF rules for withdrawal are stated very clearly and the procedure for the same is also very easy to follow.

PF Rules for Employer

The employer needs to be registered and deposit the PF amounts in the following cases:

- Establishments employing 20 or more persons
- Co-operative Societies, employing 50 or more persons & working without the aid of power.
- Establishments not coverable statutorily can come under the coverage of the Act statutorily.

Statutory Contributions by the Employer

 Statutory rate of contribution is 12% of basic wages, dearness allowance, cash value of food concession and retaining allowances if any need to be deposited

- Rate of contribution is 10% in the case of the following:
- Brick, beedi, jute, guar gum factories, coir industry other than spinning sector, silk industries.
- A matching contribution is to be collected from the emoluments of the employees.
- Out of 12% (or 10% as the case may be) of the employer's share of contribution, 8.33% is to be remitted towards pension fund.
- Employer is also required to pay a contribution of 0.5% of the emoluments towards EDLIS'1976.

Apart from this the employer is obliged to pay certain charges like administration charges (1.1%) and EDLI scheme charges (0.01%), Inspection charges (0.18%), damages/penalties ranging from 17% to 37% in case of delay.

Workmen Compensation Act

- **Objectives** : At the end of this lesson you shall be able to
- state when the Worksmen Compensation Act passed and put into force
- list the objectives of the Worksmen Compensation Act
- brief the employer's liability for compensation
- state the applicability of the Act
- brief the ammendment of the Act 1995.

Introduction to Worksmen Compensation Act

The basis of workmen compensation Act, 1923 passed in March 1923 and was put into force on 1st July 1924 is that the State (Government) cannot be a silent spectator to the suffering of the working class engaged in factories or establishments who are exposed to the various risks to their limbs and lives. There are chances of accidents and injury while working on sophisticated mechanical devices.

Amendments to the Act

The Act was amended firstly in 1933 by the Workmen's Compensation (Amendment) Act, 1933, secondly in 1938 by the Workmen's Compensation Amendment Act, 1938, thirdly in 1938 by the Workmen's Compensation (Amendment) Act 1938, fourthly in 1946, fifthly in 1959, sixthly in 1962 the workmen's Compensation (Amendment) Act, 1962 and then in 1984 by the Workmen's Compensation (Amendment) Act, 1962 and then in 1984. Now amendments have been made by the law commission of India in 1989 and lastly by the Workmen's compensation (Amendment) Act, 1995.

Objectives and Aims of the Act

- 1 To compensate a workman incapacitated by an injury from accident.
- 2 To make efforts on prevention of accidents, giving workmen greater freedom from anxiety and rendering industry more attractive.
- 3 Protection of workmen, as far as possible, from hardship arising from accidents.
- 4 The main object of the Act is to impose legal obligation on the employers to pay compensation to workmen involved in accidents while working in the premises.

Scope of the Act

The Act is applicable only to those workmen working in industries as specified in the Act. The Act affords protection to a workman from losses or injury caused by accident arising out of and in the course of employment subject to certain exceptions as laid down in the Act.

Employer's liability for compensation

To make the employer pay compensation, the death or injury suffered by the workman must be consequence of an 'accident arising out of and in the course of his employment' is dependent upon the following four conditions:

- 1 The casual connection between the injury and the accident (i.e., personal injury is caused to workman while on work).
- 2 The injury and accident caused during the course of employment.
- 3 The probability tenable to reason that the work contributed to the causing of personal injury.
- 4 The applicant proves that it was the work and the resulting strain which contributed to or aggravated the injury.
 - Applicability of the Act. The Act is applicable throughout India except the State of Jammu & Kashmir. The Act does not apply to those areas which are covered by the Employees' State Insurance Act, 1948.

The salient features of the Act are as follows:

I Extent and Application

The Act extends to whole of India. It is also applicable to the workman recruited by companies / establishments registered in India and sent to work abroad. It applies to:

- a) All railway servants not permanently employed in any administrative, district or sub-divisional office of a railway and not employed in any capacity as is specified in Schedule II to the Act.
- b) Persons employed in any such capacity as is specified in Schedule II to the Act. Schedule II includes persons employed in factories, mines, plantations, mechanically propelled vehicles, construction works and certain other hazardous occupations. In all, there are 48 employments listed in the Schedule.
- c) Persons employed in employments added to Schedule II by the State Government in exercise of the powers conferred on them under section 2(3) of the Act. In this connection, a statement indicating the additions made so far by different State Government is enclosed.

There is no wage limit for coverage under the Act. All the employees employed in Scheduled employment including the railway servants mentioned at (a) above, are therefore covered under the Act.

II Contingencies in which Compensation is payable

Compensation is payable in case of temporary / permanent disablement or death as a result of an employment injury. The contracting of any disease listed

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in Schedule III to the Act is deemed to be an injury by accident.

III Occupational Diseases

If a workman employed in the employment specified in Schedule III of the Act contracts any occupational disease peculiar to that employment he becomes eligible for payment of compensation under the Act.

The occupational diseases should be contracted while in the service of an employer in the specified employment. The schedule III divides the occupational diseases in three parts, namely Part A, Part B and Part C. For diseases specified in Part A, there is no qualifying period of employment. In case of diseases specified in Part B, a person should have been employed in the specified employment for a continuous period of not less than six months before the disease is contracted. For the diseases specified in Part C, the qualifying period is specified by the Central Government. The qualifying period specified for the diseases figuring in Part C of the schedule is as given below:

(a)	Pneumoconioses	7 years
(b)	Pagassosis	3 years
(c)	Byssionesis	7 years

- (d) Extrinsio allergic alveelitis No qualifying period is required to be specified
- (e) Bronchopulmonay diseases

IV Amount of Compensation

The amount of compensation payable in different contingencies is as given below:

(a) Where death results from the injury?	an amount equal to fifty percent of the monthly wages of the deceased workman multiplied by the relevant factor / specified in Schedule IV of the Act; or an amount of fifty thousand rupees, whichever is more;
(b) Where permanent total disablement?	an amount equal to sixty percent of the results from the injury monthly wages of the injured workman multiplied by the relevant factor in Schedule IV of the Act. or an amount of sixty thousand rupees, whichever is more;
(c) Where permanent?	 (i) in the case of an injury specified in Part II of Schedule I, such percentage of the compensation which would have been payable in the case of permanent total disablement as is specified therein as being the percentage of the loss of earning capacity caused by that injury; and
	(ii) in the case of an injury not specified in schedule I such percentage of the compensation payable in the case of permanent total disablement as is proportionate to the loss of earning capacity (as assessed by the qualified medical practitioner) permanently caused by the injury;
(d) Where temporary disablement, whether total or partial results from the injury?	 a half-monthly payment of the sum equivalent to twenty five percent of monthly wages of the work man. The half-monthly payment is payable of the sixteenth day. (i) From the date of disablement where such disable ment lasts for a period of twenty - eight days, or more; or (ii) after the expiry of waiting period of three days from the date of disablement where such disable ment lasts for a period of less than twenty -eight days; and thereafter half-monthly during the disa blement or during a period of five years, which ever period is shorter.

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Note:

- Where the monthly wages of a workman exceed two thousand rupees, his monthly wages for the purposes of (a) and (b) above shall be deemed to be two thousand rupees only.
- (2) The minimum rates of compensation for permanent disablement and death specified in the Act is rupees Sixty thousand and fifty thousand respectively. The maximum amount of compensation works out to about Rs. 2,74,248.00 for permanent disablement and Rs. 2,28,540.00 for death.

V Administration

The Act does not provide for appointment of Inspectors. However, under Section 32 of the Act, the State Governments / Union Territory Administrations have to frame rules to carry out the purposes of the Act. The rule making power under the Act was originally vested in the Central Government and in exercise of these powers, the Workmen's Compensation Rules, 1924 were framed. Some of the State Government have subsequently farmed their own rules under the Act.

VI Settlement of Claims under the Act

The claims for compensation broadly fall in three categories, namely (i) uncontested cases of disablement; (ii) disputed cases of disablement and (iii) fatal cases. The procedure for settlement of the three types of cases are as given below:

(i) Uncontested cases

- (a) After a workman has given notice of the accident, the employer is expected to arrange for medical examination of the workman. It must be free of charge. The medical examination will indicate the nature of the disablement.
- (b) If the disablement is of temporary nature the employer will pay compensation as half monthly payments, direct to the workmen.
- (c) If the disablement is of permanent nature compensation will be paid in lumpsum by the employer to the workman if he is a male over 18 years of age. In the case of woman and minors, the employer will deposit the amount of compensation with the commissioner, for disbursement.
- (d) Where a workman has agreed to accept and has taken a smaller sum than the amount fixed by the Act his right to bring proceedings for the balance are protected.
- (e) Any agreement with the workman for a lumpsum payment must be registered with the commissioner by the employer.

(ii) Disputed cases

(a) If the employer refuses to pay compensation or does not pay the full amount due, the workman has to make an application to the commissioner for workman's compensation appointed by the state government or Union Territory. The application has to be made in form 'F' prescribed under the workman's compensation rules. An illiterate person can have the application prepared under the direction of the commissioner.

(b) A claim for compensation must be preferred before the commissioner within 2 years of the occurrence of the accident or in the case of death within 2 years of the date of death. In the case of contracting of a disease the accident is deemed to have occurred on the first of the day during which the workman was continuously absent in consequence of the disablement caused by the disease.

(iii) Fatal cases

- (a) The amount of compensation due has to be deposited by the employer with the Commissioner for Workmen's compensation. The Act specifically provided that no payment made directly by the employer shall be deemed to be a payment of compensation.
- (b) The Commissioner shall distribute the lumpsum amount of compensation to the dependants in such proportion as he may decide.
- (c) If the employer does not deposit the compensation the dependant or dependants have to make an application to the commissioner in Form 'G' prescribed under the workmen's compensation rules for the issue of an order to deposit compensation.
- VII Extension of the provisions of the workmen's compensation Act to hazardous employments in agriculture

The workmen's compensation act, 1923 already applies to workers employed in farming by tractors or other contrivances driven by steam or other mechanical power or electricity etc. The State Governments of Andhra Pradesh etc. were advised in March, 1976 to consider addition of the following employments to Schedule II to the Act in accordance with the provision of sub-section 3 of section 2 of the Act:

- (i) Employed in clearing of jungles or reclaiming land or ponds in which on any one day of the proceeding twelve months more than twenty - five persons have been employed.
- (ii) Employed in cultivation of land or rearing and maintenance of live stock or forest operations or fishing in which on any one day of the proceeding twelve months more than twenty - five persons have been employed.
- (iii) Employed, otherwise than in clerical capacity, in installation, maintenance, repair of pumping equipment used for lifting of water from wells, tube - wells, ponds, lakes, stream etc.
- (iv) Employed, otherwise than in clerical capacity in the construction, boring or deepening of an open well or dug well through mechanical contrivances.

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- (V) Employed, otherwise than in clerical capacity in the construction, working, repair or maintenance of a bore well.
- (vi) Employed in spraying and dusting of insecticides or pesticides in agricultural operation / plantations.
- (vii) Employed in working or repair of maintenance of bulldozers, tractors, power tillers etc.

As per available information, the State Governments of Andhra Pradesh, Arunachal pradesh, Assam, Bihar, Haryana, Karnataka, Kerala, Maharashtra, Meghalaya, Orissa, Punjab, Tamil Nadu and Tripura and U.T. Administrations of Chandigarh, Dadra and Nagar Haveli and Pondicherry have already made the proposed additions with effect from 15.9.95. The Central Government has included all the above mentioned employments in Schedule II of the Act by amending the Schedule. The matter is not, therefore, being pursued further with the remaining States /UTs.

Following are the key amendments of worksmen's compensation (Amendment) Act 2009.

SI. No.	Section	Pre-amended position	Post-amended position
1	Title	Workmen's compensation Act 1923	Tile of the Act amended to "Employees Compensation Act 1923".
2	Words and Expressions	Refer to the words 'Workman' or ' Workmen' in the Act	They are substituted by the words 'Employee' or Employees wherever they occur.
3	Schedule II	Clerks were not covered for compensation under the Act	Clerks are now covered for compensation. Please refer to schedule - II for specified employments.
4	Sec. 4(a)	The minimum ceiling limit of compensation for death was Rs. 80000/-	Now it has been revised to Rs. 1,20,000/-
5	Sec. 4(b)	The minimum ceiling limit of compensation for permanent total disablement was Rs. 90000/-	Now it has been revised to Rs.1,40,000/-
6	Sub-sec 2A of sec.4	Non-existent	This sub-section was added after sub-section(2). This entitles an employee to reimbursement of actual medical expenditure incurred by him for injuries caused during the course of employment.
7	Explanation II to clauses (a) & (b) of sec.4	Explanation - II prescribes the Maximum wage limit at Rs. 4000/- PM for the purpose of computing compensation for death and permanent disablement	The explanation was omitted and a new sub-section (IB) has been added after sub-section IA of sec 4 whereby the maximum wage limit has been revised to Rs.8000/- PM
8	Sub-sec(4) of Sec.4	The existing limit of funeral expenses is Rs.2500/-	It has been revised to Rs.5000/-
9	Sec.25A	Non-existent	A new section has been added which fixes 3 months time limit for disposal of claims from the date of reference.

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MODULE 5 QUALITY TOOLS

Theory 2.5.61

Meaning of Quality, Quality Characteristics

Objectives : At the end of this lesson you shall be able to

- explain the concept of quality consciousness
- state the impact of quality
- list the importance of quality
- learn the concept of quality
- characteristics of quality.

Quality Consciousness

Quality! can make difference between success and failure in a very competitive world.

When a person buys a shirt he looks for a Quality shirt only. When a mother wants to buy rice or wheat she selects a good quality rice.

What is the meaning of QUALITY?

Various explanations are available. They are:

 Address features 	Good performance
• Comformance to quality	 High value
Comformance to	 Long value
Specification	Nice aesthetics
Customer satisfication	Nice design
Degree of excellence	Polite and Quick
Durability	Service
 Fitness for purpose 	Reliability
Fitness for use	Robust construction
 Good design 	Strong
Good look	• Value for money
Good material	• Worthiness of the price

The Oxford dictionary definition of quality is

"degree of excellence".

Definitions of Quality

Quality is defined in various ways by various Quality. Quality gurus. Some of them are :

- Dr. J.M. Juran Quality is fitness for use.
- Edwards Deming "Quality should be aimed at the needs of the customer present and future".
- **Philip Crosby** Quality as the conformance to requirements.
- ISO defined Quality can be quantified as follows:



Where Q = Quality,

P = Performance,

E = Expectations

If Q is greater than 1, then the customer has a good feeling about the product.

Impact of Quality

Even in the tough and competitive globalization market, we need to complete the following issues like Quality, Delivery & Price.

Importance of Quality

Delivering consistent Quality every time is necessary to obtain the following credits.

- Customer Delight
- Increase market share
- Increase no. of repeated customers
- Increase profitability
- Enter into globalization
- · Become an industrial hero
- Increase morale of the employee.

Quality - Customer requirement

The primary objective of any organization is to manufacture the products to meet the users' requirements. Through this objective, other objectives such as profitability, higher output, rapid development of economy, etc. are achieved.

In essence, survival of any organization, especially industrial organization, depends on quality.

The attainment of quality is the responsibility of the designer, manufacturing planner, shop floor operator, purchase executive, service engineer, etc.

Quality has different interpretation to different people at different times.

It is a relative term when performance of a product / service meets the expectation, people feel that they have obtained Quality.

Quality is simply explained as customer satisfaction. The customer expectation may be in terms of product specifications, price or cost. The expectation will vary depending upon the customer.

Dimensions of Quality

Performance	:	Primary operating characteristics of a product, such as signal coverage, audio quality, display quality, etc.
		(consider a product: mobile phone)
Features	:	Secondary characteristics, added features, such as calculators, and alarm clock features.
Conformance	:	Meeting specifications or industry standards, workmanship (or) the degree to which a product's design or operating characteristics match pre- established standards.
Reliability	:	The probability of a product's failing within a specified period of time.
Durability	:	It is a measure of product's life having both economic and technical dimensions.
Service	:	Resolution of problem and complaints.
Response	:	Human to human interface, such as the courtesy of the dealer.
Aesthetics	:	Sensory characteristics, such as exterior finish.
Reputation	:	Past performance and other intangibles, such as being ranked first.

Quality Characteristics

Quality of Design

Quality of design is the excellence of the design in relation to the ease of manufacture and meeting the customer requirements.

Quality of conformance

Quality of conformance is the fidelity with which a product or a service conforms to the specified requirements.

Quality Assurance

Quality Assurance comprises of all those planned and systematic actions necessary to provide adequate confidence that a material, structure, component or system will perform satisfactorily in service. Quality assurance includes quality control.

Quality Control

Quality control comprises of all those quality assurance actions related to the physical characteristics of a material, structure, component or system which provide the means to measure and maintain the material, structure, component or system to pre-determined requirements. The main aim of quality control is defect prevention.

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Basic Quality Tools with few examples

Objectives : At the end of this lesson you shall be able to

- state the different type of Quality Tools & Techniques (7 QC)/functions
- state about the check sheet and its uses
- define histogram and state the uses of the histogram
- explain about pareto chart, its uses and cause and effect diagram
- state about the stratification technique and its uses
- explain about scatter diagram, control chart, variable chart and their uses.

Introduction

The 7 QC Tools are simple statistical tools used for problem solving. These 7 QC tools provide right approach for any kind of improvement activity or problems solving. These tools lend objectivity and accuracy to observation and decision making. These tools were either developed in Japan or introduced to Japan by the Quality Gurus such as Deming and Juran.

In terms of importance, these are the most useful. Kaoru Ishikawa has stated that these 7 tools can be used to solve 95 percent of all problems.

Seven Tool of Quality (7 QC) are

Tools	Functions				
1 Check Sheet	Easy Data Collection				
2 Histogram	Indicates shape of distribution				
3 Pareto Diagram	Narrow Problem Area				
4 Cause and Effect Diagram	Assess factors for problem				
5 Stratification	Effect of discrete causes				
6 Scatter Diagram	Effect of continuous causes				
7 Control Chart	Document dynamic changes and infer Patterns for corrective actions.				

1 Check Sheet

A structured, prepared form for collecting and analyzing data; a generic tool that can be adapted for a wide variety of purposes.

By collecting data,a team can make better decisions, solve problems faster and earn management support. There are two kinds of check sheets which are commonly used to record counted, measured and location data.

Recording Data Sheet

When to Use

- When data can be observed and collected repeatedly by the same person or at the same location.
- When collecting data on the frequency or patterns of events, problems, defects, defect location, defect causes, etc.

When collecting data from a production process.

How to Use

- Decide what event or problem will be observed. Decide when data will be collected and for how long
- Design the form set it up so that data can be recorded simply by making check marks or Xs(Cross) or similar symbols and so that data do not have to be recopied for analysis.
- · Label all spaces on the form
- Test the check sheet for a short trial period to be sure it collects the appropriate data and is easy to use.
- Each time when the targeted event or problem occurs, record data on the check sheet.

Uses of the Check Sheet

• Data can be collected and observed for analyzing any variable issues (Fig 1)

ig i	COMPLAINTS	DAYS				FREQUENCY	
		1	2	3	4	5	Integeration
		ÌN	п				7
	PACKAGING	=					2
	QUALITY / PERFORMANCE	ÌN	ÌN				11
	PERSONNEL	ÌЖ	ÌМ,				10
	DELIVERY	ÌN	ÌN	ÌN	Ш		18
	TOTAL						

- Very effective tool for continuos monitoring of the process, where in the variation in product, process characteristics can be addressed based on man, material, machine method and manufacturing conditions.
- An efficient tool, as it forms the base for prioritising the defects, defects causes, defect locations etc.,

2 Histogram (Fig 2)

The histogram is a bar chart showing a distribution of variables. This tool helps identify the cause of problems in a process by the shape of the distribution as well as the width of the distribution.

Histograms provide a simple, graphical view of accumulated data, including its dispersion and central tendency. An example would be, to line up height a group of people in a course.



Normally one would be, to line up by height a group of people in a course.

Normally one would be the tallest and one would be the shortest and there would be a cluster of people around an average height.

Hence the phrase Normal distribution. In addition to the ease with which they can be constructed, histograms provide the easiest way to evaluate the distribution of data.

When to Use

- When the data are numerical
- When you want to see the shape of the data's distribution, especially when determining whether the output of a process is distributed approximately normally.
- During analysis whether a process can meet the customer's requirements.
- When analyzing what the output from a supplier's process looks like.
- When seeing whether a process change has occurred from one time period to another.
- When determining whether the outputs of two or more processes are different.
- When you wish to communicate the distribution of data quickly and easily to others.

How to use

- Calculate the range of the observations
- Decide on the number of classes in the frequency distribution table
- · Find the class interval
- Find the class boundaries and class mid points
- Construct the frequency distribution table tallying the observations
- Construct the histogram with the class intervals in the X axis and the frequency in the Y axis
- · Superimpose the specification limits

3 Pareto Chart

A pareto chart is a graphical tool that helps to break a big problem down into its parts and identify which parts are the most important. The Pareto shows the distribution of items and arranges them from the most frequent to the least frequent with the final bar being misc.

The tools are named after Wilfred Pareto, the Italian economist who determined that wealth is not evenly distributed. Some of the people have most of the money.

This tool is a graphical picture of the most frequent causes of a particular problem. It shows where to put your initial effort to get the best gain.

Pareto charts are extremely useful because they can be used to identify those factors that have the greatest cumulative effect on the system, and thus screen out the less significant factors in an analysis. Ideally, this allows the user to focus.

This, in other words called as 80:20 analysis. Prioritizing the vital few issues is the significance of this tool.

Monitoring "Vital few, trivial many"

When to use

- When analyzing data about the frequency of problems or causes in a process.
- When there are many problems or causes and you want to focus on the most significant
- When analyzing broad causes by looking at their specific components.
- When communicating with others about your data.

How to use

- · Decide what categories you will use to group items.
- Decide what measurement is appropriate. Common measurements are frequency, quantity, cost and time.
- Decide what period of time the chart will cover : One work cycle? One full day? A week?
- Collect the data, recording the category each time. (or assemble data that already exist.)
- Subtotal the measurements for each category.
- Determine the appropriate scale for the measurements you have collected.

The maximum value will be the largest subtotal from step 5. (If you will do optional steps 8 and 9 below, the maximum value will be the sum of all subtotal from step 5.) Mark the scale on the left side of the chart.

• Construct and label bars for each category. Place the tallest at the far left, then the next tallest to its right and so on. If there are many categories with small measurements, they can be grouped as "other". Steps 8 and 9 are optional but are useful for analysis and communication.

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- Calculate the percentage for each category : the subtotal for that categories. Draw a right vertical axis and label it with percentages. Be sure the two scales match: For example, the left measurement that corresponds to one -half should be exactly opposite to 50% on the right scale.
- Calculate and draw cumulative sums : Add the subtotals for the first and second categories, and place a dot above the second bar indicating that sum.

To that sum add the subtotal for the third category, and place a dot above the third bar for that new sum. Continue the process for all the bars. Connect the dots, starting at the top of the first bar. The last dot should reach 100 percent on the right scale.

- This cumulative frequency of the defects will be useful for monitoring 80:20. Thereby, the
- Vital issues are sorted out dealt with earlier, rather than dealing with issues of less importance.

Illustration

Fig 3 shows how many customer complaints were received in each of five categories







If all complains cause equal distress to the customer, working on eliminating document-related complains would have the most impact, and of those, working on quality certificates should be most fruitful

Uses of Pareto

- Used for analyzing data about the frequency of problems or causes in a process.
- When there are many problems or causes and you want to focus on the most significant and frequently occurring problems.
- Can be used for prioritizing and ranking the problems.
- Can be used for analyzing broad causes by looking at their specific components.
- Used for communication the view of analysis about your data.

4 Cause and Effect Diagaram

The cause and Effect diagram is also called the fishbone chart or Ishikawa diagram. (Fig 5) Its most frequent use is to list the cause of particular problems.

The lines coming off the core horizontal line are the main causes and the lines coming off those are sub causes. (Fig 5)



When to use

- When identifying possible causes for a problem
- Especially when a team's thinking tends to fall into ruts.

How to use

Materials needed : flipchart or whiteboard, marking pens

- Agree on a problem statement (effect). Write it at the center right of the flipchart or Whiteboard. Draw a box around it and draw a horizontal arrow running to it.
- Brainstorm the major categories of causes of the problem. If this is difficult use generic headings:
 - Methods
 - Machines
 - People
 - Materials
 - Measurement
 - Environment
- Write the categories of cause as branches from the main arrow.

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- QUALITY TOOLS
- Brainstorm all the possible causes of the problem. Ask : Why does this happen?

As each idea is given, the facilitator writes it as a branch from the appropriate category.

Causes can be written in several places if they relate to several categories.

Again Ask "why does this happen"? about each cause.

Write sub-causes branching off the causes.

Continue to ask "Why"? and generate deeper levels of causes. Layers of branches indicate causal relationships. • When the group runs out of ideas, focus attention to places on the chart where ideas are few.

Illustration (Fig 6)

This fishbone diagram was drawn by a manufacturing team to try and understand the source of periodic iron contamination.

The team used the six generic headings to prompt ideas. Layers of branches show through thinking about the causes of the problem.



5 Stratification

Stratification is a technique used in combination with other data analysis tools. Also called, flowchart or run chart. When data from a variety of sources or categories have been lumped together, the meaning of the data can be impossible to see. Stratification is a way of dividing a whole group of data into subgroups.

It allows to see if there are differences in the data from the different sub groups. Simply, stratification is a technique for finding major sources of variation in a process.

When to Use

- Before collecting data
- When data come from several sources or conditions, such as shifts, day of the week, suppliers or population groups
- When data analysis may require separating different sources or conditions.

How to use

 Before collecting data, consider which information about the sources of the data might have an effect on the results. Set up the data collection so that you collect that information as well. When plotting or graphing the collected data on a scatter diagram, control chart, histogram or other analysis tool, use different marks or colours to distinguish data from various sources.

Datas that are distinguished in this way are said to be "stratified".

• Analyze the subsets of stratified data separately. For example, on a scatter diagram where data are stratified into data from source 1 and data from source 2.

Draw quadrants, court points and determine the critical value only for the data from source 1, then only for the data from source 2.

Illustration

The ZZ - 400 manufacturing team drew a scatter diagram to test whether product purity and iron contamination were related, but the plot did not demonstrate a relationship. Then a team member realized that the data came from different reactors. The team member redrew the diagram, using a different symbol for each reactor's data :

Now patterns can be seen. (Fig 7) The data from Reactor 2 and reactor 3 are circled. Even without doing any calculations, it is clear that for those two reactors, purity decreases as iron increases.

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However, the data from reactor 1, the solid dots that are not circled, do not show that relationship. Something is different about reactor 1.

Consideration

Here are examples of different sources that might require data to be stratified:

- Equipment
- Shifts
- · Departments
- Materials
- Supplier
- · Days of the week
- · Time of the day
- Products

Survey data usually benefit from stratification

 Always consider before collecting data whether stratification might be needed during analysis. Plan to collect stratification information. After the data are collected it might be too late.

On your graph or chart, include a legend that identifies the marks or colour used.

6 Scatter Diagram

A Scatter diagrams is a graph that helps you visualise the relationship between two variables. It can be used to check whether one variable is related to another variable and is an effective way to communicate the relationship.

Types of Co relation (Fig 8)



- Positive and Linear Correlation
- Negative and Linear Correlation
- Negative non linear Correlation
- No relationship

When to use

- · When you have paired numerical data
- When your dependent variable may have multiple values and each of your value has independent variable.
- When trying to determine whether the two variables are related, such as when trying to identify potential root causes of problems
- After brainstorming causes and effects using a fishbone diagram, to determine objectively whether a particular cause and effect are related.
- When determining whether two effects that appears to be related both occur with the same cause.
- When testing for auto correlation before constructing a control charts

How to Use

- Collect pairs of data where a relationship is suspected
- Draw a graph with the independent variable on the horizontal axis and the dependent variable on the vertical axis.

For each pair of data, put a dot or a symbol where the x-axis value intersects the y-axis value. (If two dots fall together, put them side by side, touching, so that you can see both.)

 Look at the pattern of points to see if a relationship is obvious. If the data clearly form a line or a curve, you may stop.

The variable are correlated. You may wish to use regression or correlation analysis now. Otherwise, complete steps 4 through 7.

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- Divide points on the graph into four quadrants. If there are X points on the graph,
- Count X/2 points from top to bottom and draw a horizontal line.
- Count X/2 points from left to right and draw a vertical line
- If number of points is odd, draw the line through the middle point.
- Count the point in each quadrant. Do not count points on a line
- Add the diagonally opposite quadrants. Find the smaller sum and the total of points in all quadrants
 - A = Points in upper left + points in lower right
 - B = Points in upper right + points in lower left.
 - Q = the smaller of A and B
 - N = A+B

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- Look up the limit for N on the trend test table
- If Q is less than the limit, the two variables are related.
- If Q is greater than or equal to the limit, the pattern could have occurred from random chance.

7 Control Charts

The control chart is a line chart with control limits also called : Statistical process control. It is based on the work of Shewhart and Deming.

By mathematically constructing control limits at 3 standard deviations above and below the average, one can determine what variation is due to normal ongoing causes (common causes) and what variation is produced by unique events (special causes).

By eliminating the special causes first and then reducing common causes, quality can be improved. Control charts for variable data are used in pairs. The top chart monitors the average, or the centering of the distribution of data from the process. The bottom chart monitors the range, or the width of the distribution.

Type of Data

Different type of control charts can be used, depending upon the type of data. The two broadest groupings are for variable data and attribute data.

• Variable data are measure on a continuous scale. For example : Time, weight, distance or temperature can be measured in fractions or decimals.

The possibility of measuring to greater precision defines variable data.

 Attribute data are counted and cannot have fractions or decimals. Attribute data arise when you are determining only the presence or absence of something: success or failure, accept or reject, correct or not correct. For example, a report can have four errors or five errors, but it cannot have four and a half errors.

Variable Charts (Fig 9)



- -X and R chart (also called averages and range chart)
- -X and S chart
- Charts of individual (also called X chart, X R charts, IX-MR chart, Xm R chart, moving range chart)
- Moving average moving range chart (also called MA MR chart)
- Target charts (also called difference chart, deviation charts and nominal charts)
- · CUSUM (also called cumulating sum chart)
- EWMA (also called exponentially weighted moving average chart)
- Multivariate chart (also called Hotelling T2)

Attribute charts

- P chart (also called proportion chart)
- np chart
- c chart (also called count chart)
- u chart

Charts for either kind of data

- short run charts (also called stabilized charts or Z charts)
- group charts (also called multiple characteristic charts)

When to use

- When controlling ongoing processes by finding and correcting problems as they occur.
- When predicting the expected range of outcomes from a process.
- When predicting the expected range of outcomes from a process.

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- When determining whether a process is stable (in statistical control)
- When analyzing patterns of process variation from special causes (non-routine events) or common causes (built into the process).
- When determining whether your quality improvement project should aim to prevent specific problems or to make fundamental changes to the process.

How to Use

- Choose the appropriate control chart for your data
- Determine the appropriate time period for collecting and plotting data.
- Collect data, construct your chart and analyze the data.

• Look for "out of control signals on the control chart. When one is identified, mark it on the chart and investigate the cause. Document how you investigated, what you learned, the cause and how it was corrected.

Application

Most commonly used control chart is average & range chart (X-R) charts), with typical subgroup size 4, 5 or 6.

When subgroup sizes are to be increased beyond 9, the control chart to be used is Average and Standard Deviation chart (X-R chart)

Median charts are used if the calculation of Average is difficult for the operator.

Moving Range charts are used when the rate of production is low and only single observation are possible.

Employability Skills - Quality Tools

Analyse the problems using Quality Tools

Objectives: At the end of this exercise you shall be able to

- draw a pareto diagram to identify the major causes for complaints
- draw a scatter diagram to establish the cause and effect relationship
- draw the cause and effect diagram
- do stratification based on the situation of work area.

TASK 1 : Draw a pareto diagram to identify major causes for complaints

- Given below is the number of different types of complaints received from customer. Write the customer complaints from higher frequency to lower in the provided table.
- Write the percentage of total for each complaint in the provided table.
- Write the cumulative percentage (Cum %) for each complaint in the provided table.
- Plot the No. of complaints and cumulative percentage for each customer complaint in the provided sheet.
- Draw the No. of complaints and Cum% line by joing the plotted points
- Get it checked with your instructor.

Customer complaints	Numbers
Delayed delivery	60
Wrong material	20
Missing	10
Less quantity	80
Documentation errors	15
Damaged packages	10
Others	5
Total	200

Category	Type of Complaint	Numbers	%	Cum %
А				
В				
С				
D				
E				
F				
G				
	Total	200		



TASK 2 : Draw "cause and effect" diagram for highway accidents

- · Identify the problem.
- Write down the various factor involved in the mentioned problem in the provided bone diagram.
- Write down the possible cause in the provided diagram.
- With all the details available in the fish bone cause & effect diagram, analyse the diagram.
- Get it checked with your instructor.



TASK 3 : Draw a scatter diagram to establish the cause and effect relationship

- The impurity was suspected to increase on a day from start of shift to the end of shift.
- A team was constituted to study the problem.
- Analyse the below collected data by the team on the amount of impurity in the line every half an hour.
- Draw a scatter diagram for the situation given above to establish the cause and effect relationship.
- · Get it checked by your instructor.
- Draw a scatter diagram for the situation given below.

Employability Skills - (NSQF) Quality Tools : Exercise 2.5.62

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Operator/No. of Hours of work	Day 1
0.5	20
1.0	40
1.5	24
2.0	25
2.5	42
3.0	25
3.5	45
4.0	19
4.5	35
5.0	44
5.5	44
6.0	25
6.5	44
7.0	42
7.5	22
80	23

TASK 4 : Stratify the situations of work area

- Identify the situations from your work area.
- Categorize them into various categories based on situatory topic.

Area/Department/Function	Topic/Situation	Ways to Stratify (Categories)

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• Get it checked with your instructor.

Employability Skills - (NSQF) Quality Tools : Exercise 2.5.62

Employability Skills - Quality Tools

Quality Circle, definition, role and functions of Quality Circles

Objectives: At the end of this lesson you shall be able to

- state the philosophy of quality circle
- explain the concept of PDCA cycle with case studies
- state the concept of quality management system (QMS)
- define ISO (International Organization for Standardization) and state it's elements
- define terms used in ISO.

Introduction

There are various tools and techniques available to increase the output for the same input or decrease the input for the given output. Quality Circle (QC) is one of the familiar for including productivity

Quality circles originated in Japan in 1962 under the leadership and guidance of the union of Japanese Scientists and Engineers (JUSE).

In 1982 Quality Circle was introduced in India by Dr. P.C.Mahalanabis

The intention was to use the knowledge that was gained by experience in the work place in addition to the labour of the task performer.

Definition of a Quality Circle

It is a small group of people doing similar work, meeting to identify, analyze and solve product quality problems. They usually meet for half an hour to one hour each week in or near their area.

Membership is strictly voluntary and anyone who wishes to join is welcomed as a member.

Each person is free to decline membership. An active Circle will attract more people in the long run.

Basic Concept

A Quality Circle always consists of a small group of employees.

It is necessary that they perform similar kind of work or represent the same work area so that they have common experiences to share.

These members join QCs voluntarily and meet regularly to identify, analyze and evolve ways and means to solve work - related problems.

The ultimate objective of a QC is not only to improve the quality of performance of an organization, but also to enrich the quality of work life of its employees.

The following issues need to be discussed for understanding the basic concepts of QCs.

Other Names of Quality Circles

- Small Groups
- Action Circles
- Excellence Circles
- Human Resources Circles
- Productivity Circles

Objectives of quality circle

In order to achieve success in the Quality Circle program it is extremely important to lay down objectives or goals. Well-defined objectives help management to direct various activities and efforts, and to plan personnel and funding for future growth.

Hence, it is essential to define objectives clearly and to relay them throughout the company. The objectives can consist of many goals, major and minor, short-range and long-range.

As time goes on, the goals should be constantly reviewed and updated so that everyone is fully aware of the current program, and goals are kept compatible with the conditions that presently exist in the company.

There are a number of objectives that can be accomplished in the quality Circle program. The following will give some ideas of the accomplishments that one can work towards.

- Self-development
- Mutual development
- Improvement in quality
- Improvement in communications and attitude
- Waste reduction
- Job satisfaction
- Cost reduction
- · Improvement in productivity
- · Safety improvement
- Problem solving opportunities

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Team building

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- Link all levels of management and workers together to achieve success
- Get people more involved and interested in their work
- Improve participation
- Reduce absenteeism and grievances.

Quality Circle Size

It is desirable that the size of a QC is neither too small nor too large.

Quality Circle of Five to Fifteen can be a group, but an ideal small group will be around eight to ten.

Organisational Structure

The structure of a Quality Circle consists of the following elements. as shown in Fig 1.



Methods of working Quality Circle

The method of quality circle working is shown in Fig 2



Basic tools used in QC

- 1 Check Sheet or Data Collection
- 2 Stratification
- 3 Graph and Control Chart
- 4 Pareto Chart
- 5 Cause and Effect Diagram
- 6 Histogram
- 7 Scatter Diagram

Roles and function of Quality circle Benefits to Individual by QC

- Improve Knowledge
- Improve self confidence
- Develop problem solving skill
- Opportunity to learn new technologies
- Makes proud and self motivating
- Builds goods team work

Benefits to Organization by QC

- The Organization gets the total man
- Quality of work life is stressed and improved
- Brings out extra-ordinary qualities from ordinary people
- An opportunity for collecting ideas
- Maintain pleasing working environment

How QC makes as a forum

- Training
- Competition
- Motivation
- Evaluation
- Review the effectiveness
- Distribute news lets, magazines & posters
- Participating National & International QC Competition.

PDCA Cycle (Plan-Do-Check-Act) - A Problem Solving Process (Fig 3)

1 PLAN

Identify the Problem

Select the problem to be analysed: clearly define the problem and establish a precise problem statement; set a measurable goal for the problem solving effort; and establish a process for coordinating with and gaining approval of leadership.

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Analyse the Problem

Identify the Processes that impact the problem and select one; list the steps in the process as it currently exists; map the Process; Validate the map of the process; identify potential cause of the problem; Collect and analyze data related to the problem; Verify or revise the original problem statement; identify root causes of the problem; and collect additional data if needed to verify root causes.

2 Do

Develop Solutions

Establish Criteria for selecting a solution; generate potential solutions that will address the root causes of the problem; select a solution; gain approval and supporter to the chosen solution; and plan the solution.

3 Check

Evaluate the Results

Gather data on the solution; and analyse the data on the solution

Achieved Goal?

If yes go to step 6; and if no go back to step 1

4 Act

Standardize Solution

Identify Systemic changes and training needs for full implementation; adopt the solution; plan ongoing monitoring of the solution; continue to look for incremental improvements to refine the solution; and look for another improvement opportunity.

Case Study 1 (from Quality Circle by S R UDPA)

LSS HOSPITAL, KOTA

Quality Circle

Name : Cure

Section : Nursing staff

Data of formation : October 17, 1988

Problem solved

Improper Housekeeping

Effect of the problem

Loss of money, loss of material, customers loss, hospital image tarnished, loss of harmony amongst staff and patients, lengthy and laborious working, and patients suffer.

Data was collected and plotted on diagrams as follows: (Fig 4)



Cause and effect diagram: Untidy housekeeping



Recommendations

(Fig 5)

- Introduction of check-sheet General ward material Nursery ward material
 - Emergency Drugs
 - Instruments
- · Shift ward boy should report to shift sister-in-charges

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- One separate lab attendant for pathology lab and radiology unit
- Quick communication system to call ward boy or doctor in campus by call-bell or intercom
- Liquid soap container on wash-basin instead of soapcakes
- Check on washermen material.

Results of implementation are shown in the following graph. (Fig 6)



Case Study 2

(from Quality Circle by S R UDPA)

VEHICLE FACTORY, JABALPUR

Project: Frequent breakdown of vertical turret lathe

The vertical turret lathes of Kirloskar make are used for the manufacture of the brake drum, clutch housing and steering knuckle carrier, which are the most vital components and very often pose threats in the assembly of shaktiman Vehicle, affecting its output.

These VTLs down often, causing repeated interruptions of production of these components.

The project was, therefore, selected to reduce the downtime of these machines, which would not only automatically improve the productivity, but also enable the maintenance people to concentrate on the breakdowns of other machines.

Data collection

While analyzing the problem, six months data was collected to ascertain the nature of breakdowns and its down-time, as shown below:

A pareto chart was drawn in accordance with the data collected.

Type of defects

In Pareto chart (Fig 7) though the defects viz feed not working(A) Was for maximum days, i.e. 168 days, and machine giving ovality and steps on the job (B) was second in order, i.e. 154 days, these were not taken up because in these two cases defects were found only on two particular machines.



Types of defects	Total no. of days of breakdown
A Feed not working	168
B Machine giving ovality and steps on the job	154
C Clutch mechanism failure	96
D Machine frequently tripping	60
E Oil leakage	53
F Turret head problems	42
G Belts damaged	16
H Chuck wobbling	10
I gears not engaging	5

While in the former case, there was delay in arrival of the manufacturer's service representatives, in the latter case, the machine could not be attended due to excessive maintenance work load.

Hence, the next defect, clutch mechanism failure (C), which caused the machines to break down for 96 days was taken up for analysis.

Data was again collected machine-wise to find out which machine suffered maximum defect and pareto chart was made again as shown in Fig 8.

Machine Number

According to the Pareto Chart, machine No.1809 was under break-down

Due to clutch failure for 32 days which was maximum and the problem was of a recurring nature. Hence, that machine was taken up for detailed analysis.

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Employability Skills - (NSQF) Quality Tools : Theory 2.5.63



In the brainstorming session the probable causes of the defect were enlisted and the Ishikawa diagram was drawn as shown in Fig 9.

During a detailed study of each and every probable cause, it was revealed that the intricate design was contributing maximum towards the effect.

In the existing system the clutch wire has to pass over a number of pulleys and cams as a result, the probability of the breakage of clutch wire was very frequent.

The Circle members has reached the conclusion that the existing system of intricate design was to be eliminated and simplified. The following suggestions came up:

- Mechanical attachment with bevel gears to be used to operate clutch valve unit.
- Magnetic solenoid coil to be used for operating the clutch valve unit through rack and pinion system.



- Hydraulic solenoid coil to be used for operating the clutch without utilizing clutch valve unit.
- Chain and sprocket system to be made for operating clutch valve unit.

Implementation

After detailed discussions on technical parameters of each of the above suggestions and keeping in view the existing resources, it was decided to accept the suggestion that the hydraulic solenoid system could be implemented after taking trials.

In this system the hydraulic solenoid valve will regulate the hydraulic flow for the brake and clutch. Accordingly, this was implemented in machine no.1809.

Employability Skills - (NSQF) Quality Tools : Theory 2.5.63

Benefits

- The modified system is very simple
- Operation and maintenance has become easy
- Since the chances of failure in this system have been reduced, it will reduce the down-time of the machine and productivity will be increased automatically as the availability of machine for production has been increased
- Maintenance men get more time for attending to other break-downs
- Maintenance men can concentrate more on critical problems.

Recommendations

The VTL 1809 has not gone under breakdown for clutch failure for the last four months after the modifications. Further, the manufacturer of the machine has given clearance to the modified design and operators have confirmed its easy handling.

Hence, the remaining five VTLs should also be taken up for such modifications for which the following items will be required.

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Theory 2.5.64

Idea of ISO-9000 and BIS system and its importance in maintaining quality

Objectives: At the end of this lesson you shall be able to

- understand the importance of ISO-9000 quality system
- learn the elements of ISO-9000-2015
- learn the steps to get ISO recognition
- learn the function of BIS.

Quality Management System (QMS)

The Quality System as defined by the International organization for Standardization (ISO) in its 9000 series of standards was developed in response to the challenges of increasing market globalization.

It has been widely accepted and adopted by more than 140 countries in all regions of the developed and developing worlds.

These standards are viewed as powerful tools for effective management not only of product quality but also of all business operations irrespective of their sector.

One of the unique features of the ISO 9000 standards is third-party certification of an organizations quality system. This enhances its market image and helps establish its credibility among its customers worldwide.

Quality and system are two essential requirements for an organization to ensure its product or service Quality in the competitive market. So it is needed for organization to adopt and accredit to QMS - ISO 9001.

Definition

International Organization for Standardization (ISO) defined the term quality system as follows:

The quality systems are the orgnisational structures, responsibilities, procedures, processes and resources for implementing quality management.

The Quality system should function in such a manner as to provide proper confidence that

- · The system is well understood and effective
- The products or services actually do satisfy customer expectations
- The emphasis is placed on problem-prevention rather than dependence on detection, after occurrence

In short, a quality system involves

- How Methods and process description
- Who responsibilities and authorizes
- When records and evidence

Where - Identification and traceability.

The purpose of the ISO standards is to facilitate the multinational exchange of goods and services by providing a clear standard quality system requirements - ISO 9001.

International Organization for Standardization (ISO)

The International organization for standardization (ISO) established its Headquarters at GENEVA in SWITZERLAND.

There are three core ISO standards, they are

ISO 9000-2000 - Quality Management System (QMS). Fundamentals and vocabulary for understanding the standards.

ISO 9001-2000 - QMS requirements for certification purpose this standard replaced ISO 9001, 9002 & 9003.

- ISO 9001- Design, Manufacture, Commissioning & Service after Sales,
- ISO 9002-Manufacture, Commissioning & Service after Sales.
- ISO 9003-Inspection and testing.

ISO 9004-2000 - QMS Guidelines for performance improvement This standard is for driving the organization towards Business performance improvements.

BIS: Bureau of Indian Standards is a **National standards body** in collaboration with international **Standard Bodies**. BIS is a founder member of international organiation for standardisation (ISO), It represents india in ISO,IEC and **world standards service network** (WSSN).

Eight Management Principles

- Customer Focus
- Leadership
- Involvement of people
- Process Approach
- System approach to management
- Continual Improvement
- Factual approach to decision making
- · Mutually benefical supplier relationships
- 1 Customer Focus

Organizations depend on their customers. Hence it is necessary to understand present and future customer needs.

It is important to find and meet the customer requirements also strive to exceed customer expectation.

Elements of ISO 9001

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Elements	Purpose
Management Responsibility	To apportion Responsibility for Quality
Quality System	 Documented procedure to ensure that the product / service conform to the specific requirements consistently.
Contract Review	 Identify and state quality requirements
Design Control	 To have procedures to control and verify.
Documents and data control	To make available valid documents at all locations.
Purchasing	To ensure Quality in supplies.
Control of customer supplied product	To ensure quality.
Product identification and Traceability	To ensure traceability
Process Control	To ensure quality in process.
Inspection and Training	Proof of quality through tests
 Control of Inspection Measuring and Test equipments 	Ensure suitability of test equipments
Inspection and Test Status	Proof of satisfactory inspection.
Control of nonconforming product	To prevent inadvertent use of defective items
Corrective and Preventive action	Investigation and preventing repeated errors.
Handling, Storage, preservation and Delivery	Prevent damages and Mix-ups.
Control of Quality records	Proof and information of quality
Internal Quality Audit	To monitor efficacy of quality system
Training	Ensure adequate personnel qualification
Servicing	Provide contractual obligation
Statistical Techniques	 Forecasting, Verification and assessment of quality characteristics.

2 Leadership

Leaders establish unity of purpose and direction of the organization.

They should create and maintain the internal environment in which people can become fully involved in achieving the organization's objectives.

3 Involvement of People

People at all levels are essence of organization and their full involvement enables their ability to be used for the organization's benefit.

4 Process Approach

A desired result is achieved more efficiently when activities and related resources are managed as a process.

5 System Approach to Management

Identifying, understanding and managing interrelated processes as a system contributes to the organization's effectiveness and efficiency in achieving its objectives.

Employability Skills - (NSQF) Quality Tools : Theory 2.5.64

QUALITY TOOLS

6 Continual Improvement

Continual improvement of the organization's overall performance should be a permanent objective of the organization.

7 Factual Approach to Decision Making

Effective decisions are based on the analysis of data and information.

8 Mutually Beneficial Supplier Relationships

An organization and its suppliers are interdependent and a mutually beneficial relationship enhances the ability of both to create value.

Steps to go for ISO 9001 Registration

- Decision to go for ISO 9001 Certification by Top Management
- Appoint Chief Executive Officer and Management Representative (MR)

- Training ISO 9001 Awareness programme
- Quality Policy and objectives formulation and Documentation
- Establishment of Quality manual, procedure, Quality work instructions and records.
- Training internal Quality Audit
- Implementation of ISO 9001QMS requirements
- Revise, improve and update the procedures / Instructions
- Internal audit.
- Management Review Meeting
- · Certifying body appointment and adequacy audit.
- Corrective and preventive action
- Pre assessment audit by certifying body
- Certification Audit



Model of Process-based Quality Management System (Fig 10)

Documentation Hierarchy in ISO 9001 (Fig 11)

The Documents requires by most organization are

- Quality Manual
- Quality System Procedures
- Work Instruction
- Records/Formats/Forms

Benefits of ISO

- It establishes, "Standard Operating System" for the business
- It institutes procedures for "Greater Customer Satisfaction / Delight" as a Team efforts by Top Management and all Employees

Employability Skills - (NSQF) Quality Tools : Theory 2.5.64



- It Empower Employees, "To establish responsibilities and Decision Making authorities"
- It improves "Communication and Co-operation" within the organization

It emphasizes on "Continual Improvement in all key process".

This enables the organizations to retain current customers attract new customers, increase market share and enhance revenue growth.

- It provides Customers a high degree of Assurance regarding the organization's Quality Management System.
- It increases Consistency in Project Execution due to the use of the same processes across multiple projects.
- It reduces the organization's reliance on "Heros" to make projects a success because all employees are aware of the required quality practices.
- It reduces (or eliminates) the organization's dependence on a few individuals for information regarding critical process because such process are formally documented.
- It reduces wastage of resources in rejection and rework of inferior quality products due to continuous improvement of the process.
- This enables the organization to shift from a reactive mode of operation (performing corrective action) to a proactive mode (performing preventive action).
- It drives the organization towards "zero defect to achieve business excellence"

Important Terms used in ISO

Quality Policy: Every organization should have a Quality policy through which Overall intentions and direction of an organization with respect to Quality shall be expressed by the Top Management

Quality Objective: Overall Quality goals set by the organization

Quality Control: Part of quality management focused on fulfilling quality requirements.

Activities that are carried to ensure Quality requirements

Quality Assurance: Part of quality management focused on providing confidence that quality requirements will be fulfilled.

Pre plan activities to assure and provide adequate confidence to the customer

Quality Improvement: Part of quality management focused on increasing the ability to fulfill quality requirements

The activities to enhance the quality in the process and Product.

Continual Improvement: Recurring activity to increase the ability to fulfill requirement

Effectiveness: Extent to which planned activities are realized and planned results achieved.

Efforts and performance realized to meet the planned results.

Process: Set of interrelated or interacting activities which transforms inputs into outputs.

Product: Result of a process

Organization: Group of people with required resources work as a team to achieve quality policy and its related objectives.

Customer: One who receives the product. (Clients / Purchaser / End User)

Supplier: One who provides the product. (Vendor and Sub-contractor)

Traceability: Ability to trace the history, application, location, of that which is under consideration.

Non Conformity: Non-fulfillment of the requirement.

Corrective action: Action to eliminate the cause of a detected non-conformity.

Preventive action: Action to eliminate the cause of potential non-conformity.

Verification: Confirmation through the provision of objective evidence, that the specified requirements have been fulfilled.

Validation: Confirmation through the provision of objective evidence, that the requirements for specific intended use or application have been fulfilled.

Procedure: It defines the detail of the process

Design and development: Design and development is a process (or a set of processes).

Inspection: Its activity to check measure and evaluate conformity

Vision: A long range of wish to view how organization would be!

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According to ISO 9004, an organization's vision describes what it wants to be and how it wants to be seen by interested parties.

Mission: The purpose of statement

According to ISO 9004, a mission statement explains why an organization exists. It defines its reason for being (its raison d'être).

Objective evidence: Objective evidence is data that shows or proves that it exists - Fact.

Objective evidence can be collected by performing observations, measurements, tests, or by using any other suitable method.

Process approach: The process approach is a management strategy. When managers use a process approach, it means that they manage the processes that make up their organization, the interaction between these processes, and the inputs and outputs that tie these processes together.

Standard: A standard is a document. It is a set of rules that control how people develop and manage materials, products, services, technologies, processes, and systems.

Strategy: A strategy is a logically structured plan or method for achieving long term goals. According to ISO 9004, you need to develop a strategy and policies to ensure that your organization's mission, vision, and values are accepted and supported by interested parties

Systems approach: When managers use a systems approach, it means that they treat the interrelated processes that make up an organization as an integrated system and then they use this system to achieve its objectives. A system is a set of elements that are interrelated or interact with one another.

Audit

Systematic, independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which audit criteria are fulfilled

Other Related Industrial Management Standards

ISO 14001:2004	:	Environmental Management
TS 16949 : 2002	:	Suppliers in Automotive Sector
ISO 13485 :2003	:	Medical Service Sector
ISO 27001:2005	:	Information Security Management system
ISO 22000:2005	:	Food Safety Management System
ISO 18001:2007	:	Health & Safety
TL 9000	:	Telecommunication
SA 8000	:	Social Accountability

Total Quality Management (TQM)

Introduction

Quality is the mantra of the successful business of any organization.

Today quality teamed with cost runs the show. In such a scenario, Total Quality Management is very essential and crucial in deciding the fate of any business. TQM plays a vital role in a customer - centric business.

All manufacturing companies have converted TQM as their constitution to produce products and services of good standard.

TQM gives employees an edge over their competitor's in the business.

TQM from employees' point of view, analyzing its influence and effect on individuals, groups, organization and business.

This will help understand whether the desired results of the TQM initiative are achieved and an aspect in right correction action needs to be taken.

What is TQM?

Total	=	= Made up of the whole							
Quality	=	Degree of Excellence of a product or service provided							
M anagement	=	Act, art, or manner of handling, controlling, directing, etc.							

TQM is the art of managing the whole to achieve excellence.

Meeting the requirements of the internal/External customer consistently by continuous improvement in the Quality of work for all employees.

Definition

TQM defined as:

TQM is the integration of all functions and processes with in an organisation in order to achieve continuous improvement of the quality of goods and services. The goal is customer satisfaction.

"TQM is a management system that integrates management techniques, continuous improvement efforts and technical tools involving all employees of the organisation aiming at continual increase in customer satisfaction at a lower real cost".

Concept of TQM

TQM is based on a number of ideas. " It means thinking about quality in terms of all functions of the enterprise and is a start to finish process that integrates inter related functions at all levels."

The overall effectiveness of the system is higher than the sum of the individual outputs from the sub systems.

Employability Skills - (NSQF) Quality Tools : Theory 2.5.64

Sub-System

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The sub systems include all the organisational functions in the life cycle of a product such as

- Design
- Planning
- Production
- Distribution
- Field service

The good bearing structure is customer satisfaction. The watch word is continuous improvement.

- The cost of quality as the measure of non-quality (not meeting customer requirements) and a measure of how the quality process is progressing.
- Enabling mechanisms of change, including training and education, communication, recognition, management behaviour, team work and customer satisfaction programs.
- Implementing TQM by
- defining the mission
- identifying the output
- identifying the customers
- negotiating customer requirements

developing a 'supplier satisfaction' that deals customer objectives and determining the activities required to fulfill those objectives.

Management behaviour includes

- Acting as role model
- Use of quality
- · Processes and tools
- Encouraging communication
- Sponsoring feedback activities and fostering
- Providing a supporting environment.

Basic to the concept of TQM is the notion that quality is essential in all functions of business, not just manufacturing.

Companies that commit to the concept of TQM apply quality improvement techniques in almost every area of

- Product development
- Manufacturing, distribution
- Administration
- Customer service.

No where is the philosophy of "Customer is King" is more prevalent than in TQM.

Essentials of TQM

To adopt and initiate. TQM with any organization, an understanding of the key elements is essential. These elements that form the essential core of the TQM philosophy and help change the attitude and culture within the organization are:

- Customer satisfaction
- Leadership
- Quality policy
- Organizational structure
- Employee involvement
- Quality cost
- Supplier selection and development

Principles of TQM

The key principles of TQM are as following

Management Commitment

- Plan (drive, direct)
- Do (deploy, support, participate)
- Check (review)
- Act (recognize, communicate, revise)

Employee Empowerment

- Training
- Suggestion scheme
- · Measurement and recognition
- Excellence teams

Fact Based Decision Making

- SPC (statistical process control)
- DOE (Design of Experiments),

FMEA (Failure Model and Effects Analysis)

- The 7 statistical quality tools
- TOPS (FORD 8D Team Oriented Problem Solving)

Continuous Improvement

- Systematic measurement and focus on CONQ
- Excellence teams
- · Cross-functional process management
- Attain, maintain, improve standards

Customer Focus

- Supplier partnership
- Service relationship with internal customers

Employability Skills - (NSQF) Quality Tools : Theory 2.5.64

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- Never compromise quality
- Customer driven standards

Pillars of TQM

The four Pillars of TQM House

- Problem solving discipline
- Interpersonal Skills
- Team work, and
- Quality Improvement process

TQM is used to improve the whole organization stepwise, structured and systematically according to

- Hard work
- Discipline
- Intensive training
- Consistent implementation of techniques and resources.

These quality principles form the foundation of TQM.

Evaluation of TQM

The TQM philosophy has evolved from quality in the sequence

Benefits of TQM

Tangible Benefits

- Improved Product Quality
- Improved Productivity
- Reduced Quality costs
- Increase market and customers
- Increased profitability
- Reduced employee grievances

Intangible benefits

- Improved employee participation
- Improved team work
- · Improved work relationships
- Improved customer satisfaction
- Improved communication
- · Enhancement of job interest
- Enhanced problem-solving capacity
- Better company image.

Main components of TQM

For Six Sigma practitioners who may not be familiar with TQM, the program has three main components

- Just In Time (JIT)
- Total Quality Control (TQC)
- Total Employee Involvement (TEI)

The relationship between the three legs of TQM is: **JIT** exposes the cause of problem; **TQC** helps provide a solution to problems. Lastly, since the employees do all improvements; they need to be involved in the process of change. **TEI** helps elicits this involvement.

Brain Stroming

Brainstorming is a simple technique that can be used to encourage group creativity.

It is a formal approach used to help a group of employees to generate as many ideas as possible in a short time as necessary in a chosen subject.

This can be extensively used on any subject including

- Development of a product
- Production Planning, Scheduling & Execution
- Machinery break down problems
- Quality problems
- New Process Implementation
- Test/Trial results
- Reliability problems
- Customer complaints
- Sales strategies
- Distribution problems
- Employees relation problems
- Strike situations
- · Accidents/Safety hazards
- Financial Problems

Brainstorming is a critical part of all problem solving activities and is used both at the problem identification stage as well as in the various problem solving and creative stages of the process.

It is a technique which is often underrated and which people become better at the more they use it.

It is based on the principle that every employee becomes creative in the subject related to his field of work or knowledge or specialization

When given an opportunity and freedom (to express without interruption and comments).

Maximum benefit will be gained by adopting formal guidelines based upon three main features.

Cross fertilization - This happens when two or more people have a part of an idea which on its own may seem irrelevant but when all are brought together an useful original idea is generated.

Susper session Susper particul explore

Suspending judgment - This is crucial, the brainstorming session is purely for generation of ideas, not evaluation.

Suspending judgments helps to avoid looking in one particular area of ideas, thus exhausting opportunities to explore all the possibilities.

No idea should be considered ridiculous. It is a part of the Chairman's role to prevent participants from making comments such as **"That would never work because"** or 'we have done it before".

Formality of setting - particularly at the early stages, this helps to remove some of the tension that people may feel, which makes them hesitant to suggest ideas.

As people become more familiar with the technique and expressing ideas. The setting often has the influence.

Brainstorming works most effectively when there is a group of people responding within the following frame work.

It is the role of the chairman to ensure this happens.

- Define the central issue and make sure everyone understands and agrees upon it.
- Everyone should be allowed and encouraged to contribute, No one should dominate.
- Don't discuss just concentrate on writing up ideas as possible concentrate on writing up ideas as quickly as possible.
- Never criticize ideas
- Builds on other's suggestions by using the thoughts of others to trigger one's own thought process the classic lateral thinking approach.
- · Make no attempt to evaluate ideas
- Go for Quantity by trying to write up as many ideas as possible within a period of time, say five or ten minutes.
- When the team drives up, try to get more ideas of your own, urging them on, or by selecting the wildest idea and building in it.
- The session should run for a set time or until all ideas have been exhausted, whichever is shorter

Great enjoyment and feeling of contributing can be gained from brain storming, particularly when an idea is found that would not have come from an individual member alone.

The underlying goal of brainstorming is the maximum number of ideas generated not the quality

Guidelines for Brainstorming

• Each member, in rotation, is asked for ideas. This continues until all ideas are exhausted

- Only one idea per turn is offered by an individual
- A member, having no idea, simply says Pass
- No idea should be treated as stupid. Criticism or ridicule would inhibit free flow of ideas
- Rigid formality should be avoided. Good-natured humor enthuses members to open up freely
- The Leader should help in summarizing an idea and guide members in clarity of expression
- · No evaluation of ideas is done during brainstorming
- A black-board, a large sheet of paper or transparent sheets for use on an overhead projector could be used for listing out ideas
- After all the ideas are exhausted and brainstorming is over, each ideas is taken up for detailed discussion and a consensus by voting is taken, if necessary, to select those ideas which are vital, and valid
- The brainstorming technique can be effectively used to identify problems affecting the work-area, factors which can prevent potential problems, causes responsible for problems, solutions to problems, etc.,
- The members might find it useful to ask questions to themselves based on the five Ws and one H, i.e.,
 - What?
 - Why?
 - When?
 - Where?
 - Who?
 - How?
- If an outsider happens to drop in during a brainstorming session, he may be asked to join in
- If an agenda is distributed to members prior to the meeting, it would enable them to think about the topic scheduled for brainstorming in advance, and thus be ready with many ideas, when the meeting starts
- It would be useful to keep records of brainstorming for future reference.

The Technique and the Result

Brainstorming usually involves six to eight persons and the generation of ideas run from thirty minutes to one hour.

Even 'outsiders' who are not normally connected with the activity under consideration are included in the sitting with a belief that a fresh mind may come out with an idea which does not occur to those who are living with the problem.

An one hour session is likely to produce 50 to 150 ideas.

Most ideas will be impractical, but some will merit serious consideration.

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Theory 2.5.65

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Purpose of house keeping and practice

Objectives: At the end of this lesson you shall be able to

- learn the importance and usefullness of house keeping
- learn the japanese 5's technique
- understand the effects of 5's implementation.

Cleaning and house keeping:

Cleaning is the process of removal of unwanted matter contaminants or pollutants from the surrounding of shopfloor which will ultimately result in overall improvement. House keeping not only ensures safety but also improves the health of employees and prevents possible accidents hazards etc.,

House keeping results in improved efficiency, increased produtivity, reduce scrap, reduction of downtime, better control of inventory etc.,

Japanese who always aims at quality and overall improvement have invented a new technique called 5s, a system of effective house keeping which is purely people involved and practice oriented approach. Each 'S' represents a Japanese word namely Seiri, Seiton, Seiso, Seiketsu, and Shitsuke, which are explained below.

5'S - Concept

5'S is a people - oriented and practice - oriented approach.

5'S expects everyone indeed - every one to participate in it.

It is based on the belief that every individual can contribute to improving his workplace where he spends one third of his life.

5'S is an employee participation program which has been found very effective in improving environment leading to total quality. It becomes a basic for continuous improvement in the organization.

The terms 5'S (Fig 1) are:

- SEIRI (Sorting out)
- SEITON (Systematic arrangement)
- SEISO (Shine Cleanliness)
- SEIKETSU (Standardization)
- SHITSUKE (Self Discipline)

Step - 1 : SEIRI (Sorting Out)

- Look around your work place and Sort out items into what you need and what you don't want
- Separate the GOOD, Re-Workable & Rejected items
- Rework the Re-workable items and dispose off rejected items
- Return the Unwanted items

Every employee is expected to avoid mix up of item by grouping them together according to its type & kind for example,

The raw material should not get mixed up with work in process (WIP).



Items are pending inspection or testing should be separated from items already inspected and accepted.

Tools should be kept separately, fixtures should be available in one place, dies should be in another place, etc.

Even stationery, forms should be maintained according to its type and kind. Following Questions may help you in deciding what action is to be taken.

Following Questions may help you in deciding what action is to be taken

- Do you find items scattered in your workplace?
- Are there boxes, papers and other items left in disorganized manner?
- · Are there equipment and tools placed on the floor?
- Are all sorted out items, placed in designated spots?
- · Are tools and stationery properly sorted and stored?

Step - 2 : SEITON (Systematic Arrangement)

Means "arrange". The motto here is

"A place for everything & Everything in its place".

We have to allocate a place for each and everything. For example, a separate shelf for dies,

A separate rack for tools, separate rack for machinery spares, an almirah for stationery, etc. should be maintained.

The aim here is that a particular item should be available in a particularly earmarked place.

Japanese follow one more system, which is 'nothing should be kept on the floor'. Even heavier items should be kept over a platform or pieces of wood / bricks, etc.

Once a place is determined for each and every item employees should be trained and disciplined to keep any item in its allocated place. This is very important for the purpose of subsequent use of the item.

This is a useful practice even for home. The advantage and benefit of this system is realized only when it is practiced.

The answers to the following questions will lead the employees to further action to be taken in this regard.

- Are passage ways and storage places. Clearly indicated ?
- Are commonly (frequently) used tools and stationery separated from those seldom used ?
- Are containers and boxes stacked up properly ?
- Are fire extinguishers and hydrants readily accessible?
- Are raw materials, WIP, finished goods, etc. separately kept in appropriate places?

Step - 3 : SEISO (Shine - Cleanliness)

Means maintain cleanliness in your work place. Cleanliness is insisted on all the places around the employee which includes, the floor, machine, equipments, pipes, wires, electrical fittings, etc.

An employee should take care of everything visible to him. Religious people normally say, cleanliness is next to Godliness! and Work place is to be treated like a place of worship!

The essence of all these sayings is that every employee should take responsibility for the thorough cleanliness of his / her work place. This will end up with clean atmosphere and environment in the entire plant or company.

The following questions would help in identifying areas for concentration.

- Are the floor surfaces dirty?
- · Are the machines and equipments dirty?
- · Are wires and pipes dirty and stained ?
- · Are machine nozzles dirtied by lubricant?
- Are shaded, light bulbs and light reflectors reflects dirt?

Step - 4 : SEIKTSU (Standardization)

Means **"maintain a standard".** This refers to the Quality of work place. A high standard maintained in around will motivate the employees to take more interest in their work and perform better.

It should also be clearly known and understood what is the standard we like to maintain. It would be always better to lay down standards for all influencing factors like sound, light, ventilation, humidity, tidiness of dresses, etc.

The following questions would aid in deciding further course of action.

- Is anyone's uniform dirty or untidy?
- Are there sufficient lights ?
- Is the noise or heat at your workplace causing discomfort?
- Is the roof leaking?
- Do people eat at designated place only?

Step - 5 : SHITSUKE (Self Discipline)

Means "training and educating people to be systematic and disciplined". It is important to make employees aware of their responsibilities, involvement and what is expected out of them.

Hence educating them and training them is the prime factor which would bring in discipline and system in the work place. It should be followed up by monitoring and control.

Wherever abnormalities are found the same should be intimated to the concerned for correction. This would ensure employees adhering strictly to the rules and regulations of the company.

The questions like the ones given below would lead to status of present situation.

- Are regular 5s checks conducted?
- Do people clean up without reminders?
- · Do people follow rules and instructions?
- · Do people wear their uniforms and safety gear properly?
- Do people assemble in time?

Benefits of 5S

- Work place becomes clearer and better organized.
- Shop and Office working becomes easier and safer.
- Results are visible to every one insiders and outsiders.
- Visible results enhance generation of more new ideas.
- People tend to be more disciplined.
- People start living in their work place and hence the work.
- People become proud of their clean work place
- People's efficiency goes up
- Greater people involvement
- Less absenteeism
- Avoid delay
- Induces clear thought process, hence more
- suggestions and creative ideas are generated.

Employability Skills - (NSQF) Quality Tools : Theory 2.5.65

- Better use of floor space.
- Less work-in-progress inventories.
- Better flow of work.
- Low accident rates
- Low machine break down, higher utilization of machinery's and equipments
- High yield of materials
- High product quality
- Higher productivity

The questions like the ones given below would lead to status of present situation.

- Are regular 5s checks conducted ?
- Do people clean up without reminders?
- Do people follow rules and instructions
- Do people wear their uniforms and safety gear properly?
- Do people assemble in time?

5D Concept

If we do not follow the 5S concept, ready to accept 5D (5 Devils)

- Delay
- Declining profit
- Dissatisfied customers
- Defects
- Demoralised Employees

KAIZEN

Kaizen is basically small small improvements carried out by the person who is doing the job in his/her day to day work. The prime motto being small-small improvements lead to Big benefits.

In Japanese,

"KAI" means Continuous

"ZEN" means Improvement

"KAIZEN" means Continuous Improvement

Continuous Improvement everyday through involvement of every one in the organization is the key for Business Excellence, which is the prime motto for a **Total Quality Organization**.

Why Kaizen?

- To remain competitive we need to change for better and hence Kaizen
- · If we do not move forward, we will move backward
- We may become worse than animals, if we do not use our ability to think
- · Nothing will give more satisfaction, motivation than

seeing our ideas implemented

- To make our job easier, safer
- To improve our Customer Service and make our customers happier
- To work smarter and not harder
- To improve productivity and Quality
- To achieve organization growth
- To become world class

Benefits of Kaizen

Collective wisdom of people brings infinite results

- Job made easier
- Drudgery removed from the job
- Nuisance removed from the job
- More Safety
- More productivity
- Quality Improvement
- Saves Time and Cost
- Job Enrichment

Who should do Kaizen?

Kaizen is to be done by every one, right across the organization, as everyone is contributing to the organization output

Where to do Kaizen?

Kaizen can be done in

- One's Own work area a) Routine & (b) Non-routine
- Common relevant areas

 a) With your department peers &
 b) With other department
- Other's work area
 (a) Canteen & (b) Reception, etc.,
- One's own personal area-House

When to do Kaizen?

Whenever there is:

- Pain area for individual
- · Pain area for organization
- Dissatisfaction over working Method

Individual's or organization's pain area will be mostly due to the 3 MU's namely

- MURI Strain
- MURA Inconsistency
- MUDA Waste

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These are three mortal manufacturing sins

Fundamentals of Improvement

- Improvements do not come about by coincidence. It is the result of conscious efforts towards them. Some useful clues towards this are:
- Start with small improvements
- Start with our problem and not their problem
- Start with easy areas
- Make improvements a daily part of routine
- Use group collective wisdom for continuous improvement
- · Never reject an idea before trying
- · Highlight problems, do not hide them
- Do not be afraid of work stoppage

Areas of Kaizen

Cost & Time Reduction

Safety

Waste Elimination

- Productivity Improvement
- **Energy Conservation**
- **Fatigue Reduction**
- Customer Service
- Quality Improvement
- System Introduction
- Visual Control System
- 5S (House Keeping)

Preventing Defect Recurrence etc.

How to do Kaizen?

Kaizen (or) Improvement Process can be broken into 2 steps:

- 1 Problem Identification &
- 2 Problem Solving

Problem is defined as the "**deviation from the standard**". It is the difference between what is expected and what is actually occurring. Solution is that which can eliminate or reduce the difference between the actual and expectation

Problem Identification

- · Understand thoroughly what is happening
- · Question every activity and result of every action
- · Compare them with standard
- Never accept status quo
- · Look where maximum dissatisfaction
- Look for problems where you think none exist
- Look at things from customers point of view in terms of Quality Cost, Delivery

Problem Solving

- · Steps to Problem solving should be:
- Analysis to find root-cause of the problem
- Idea Formulation
- Idea Selection
- Improvement
- Sustain Gains

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5'S to minimize 5'D

Employability Skills - Entrepreneurship Skills

Model Questions

- 1 A person who is associated with the starting of a business is called
 - A merchant
 - B entrepreneur
 - C business man
 - D sales executive
- 2 In an economic growth, role of entrepreneur is to
 - A generate unemployment
 - B stagnate standard of living
 - C improve per capita income
 - D unbalance the regional development
- 3 A product life cycle (PLC) is divided into
 - A 4 stages
 - B 5 stages
 - C 3 stages
 - D 2 stages
- 4 Which investment is considered for deciding the status of manufacturing enterprises?
 - A Working capital
 - B Building and land
 - C Plant and machinery
 - D Salary of employee
- 5 As compared to entrepreneur, manager
 - A is a owner
 - B has certain & fixed salary
 - C assumes risk & uncertainty
 - D has a motive to start a venture
- 6 As compared to small scale business, large scale business require.....
 - A less no. of persons
 - B less no. of capital
 - C more no. of person
 - D small machines & tools
- 7 MSME stands for
 - A Micro, Scale and Medium Enterprises
 - B Macro, Small and Medium Enterprise
 - C Micro, Small and Medium Enterprise
 - D Minor, Small and Medium Enterprise

- 8 Which stage is a period of rapid revenue growth?
 - A Growth stage
 - B Maturity stage
 - C Decline stage
 - D Introduction stage
- 9 Which one is a correct channel through which marketers can reach customers?
 - A Manufacturer \rightarrow Retailer \rightarrow Wholesaler \rightarrow Customer
 - B Manufacturer → Customer → Retailer
 - C Manufacturer → Retailer → Customer
 - D Manufacturer \rightarrow Retailer \rightarrow Customer \rightarrow Wholesaler
- 10 Consumer's buying behaviour does not depend on which factor?
 - A Buying habits
 - B Education
 - C Purchasing power
 - D Living habit
- 11 Which one is an indirect promotion technique?
 - A Publicity
 - B Advertisement
 - C Display & Models
 - D Public relation
- 12 Which one is NOT part of 4 P's of marketing mix?
 - A Policy
 - B Price
 - C Product
 - D Place
- 13 In "SWOT" analysis, "S" stands for
 - A Success
 - B Strength
 - C Survey
 - D Service
- 14 In which institute, new entrepreneurs are assisted in many area like, identification, selection, process for manufacturing products?
 - A SIDO
 - B NSIC
 - C MSME DIs
 - D SIDBI

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MODEL QUESTI

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Employability Skills - Entrepreneurship Skills

Model Questions

Model Questions

- 15 Micro credit scheme is NOT for
 - A tiny/cottage industry
 - B agricultural and allied services
 - C transport sector activity
 - D research & development activity
- 16 The expansion of SIDO is
 - A Small Industries Development Organization
 - B Small Income Development Organization
 - C Small Investment Development Organization
 - D Standard Industry Development Organization
- 17 Which one is NOT a type of feasibility?
 - A Market feasibility
 - B Technical feasibility
 - C Educational feasibility
 - D Financial feasibility

- 18 Fixed capital is also known as
 - A long term capital
 - B short term capital
 - C revolving capital
 - D working capital
- 19 In SWOT analysis which pair is helpful?
 - A Strengths, Weaknesses
 - B Strengths, Opportunities
 - C Threats, Weaknesses
 - D Threats, Opportunities
- 20 Paid form of ideas, goods and services are called
 - A publicity
 - B good will
 - С public relation
 - D advertisement

Employability Skills - Productivity

- 1 Productivity is defined as a ratio of
 - A profit to input
 - B input to output
 - C output to input
 - D profit to output
- 2 The expansion of GDP is
 - A Gross Domestic Product
 - B Gross Domestic Property
 - C Ground Domestic Product
 - D Ground Domestic Property
- 3 Which one of the following is NOT an objective of incentive?
 - A Improved quality
 - B High cost of production
 - C High output
 - D Reduced waste
- Which one is NOT a productive benefit for "Working Environment" category?
 - A Safer condition
 - B Improved air quality
 - C Improved lighting
 - D Increased noise

- 5 What is a disadvantage of automation?
 - A Increased through put
 - B Increased output consistency
 - C Reduced labour cost
 - D Security threats
- 6 Financial incentives are also known as
 - A wage incentives
 - **B** moral incentives
 - C travel incentive
 - D non cash recognition
- 7 GDP is defined as "GDP = C + G + 1 + NX" In this
 - NX =
 - A imports exports
 - B exports imports
 - C import + export
 - D export

Employability Skills - (NSQF) Model Questions

Employability Skills - Productivity

- 8 If a machine has been producing 10 pieces per working day. With the use of improved cutting tools its output in the same time is increased to 15 pieces. The productivity of that machine is increased by
 - A 10%
 - B 15%
 - C 50%
 - D 25%

9 The expansion of ATM is

- A Automated Tune Machine
- B Automated Teller Machine
- C Asynchronous Teller Machine
- D Asynchronous Time Machine
- 10 What is an advantage of automation?
 - A Reduced Operation Time
 - B High Initial Cost
 - C Unpredictable Development Cost
 - D Security Threats
- 11 Low productivity will lead to
 - A job security
 - B political stability
 - C decrease in GDP per capita
 - D increase in GDP per capita
- 12 Which one of the following is NOT a category of pure risk?
 - A Property risk
 - B Technologyrisk
 - C Liability risk
 - D Personnel risk

Employability Skills - OSH & Environment Education

- 1 Which factor is NOT concerned with occupational health and safety?
 - A Safety
 - B Health
 - C Welfare
 - D Salary

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- 2 Vibration and radiations come under
 - A chemical hazards
 - B physical hazards
 - C electrical hazards
 - D psychological hazards

- 13 During using ATM, Authentication is provided by customer by entering
 - A cash
 - B IFSC
 - C PIN
 - D KYC
- 14 A secure area to store cash is
 - A cash machine
 - B cash vault
 - C cash processing zone
 - D cash handling zone
- 15 The expansion of KYC is
 - A Know Your Customer
 - B Know Youth Creditors
 - C Kid and Young Customer
 - D Know Your Cash
- 16 Which one of these documents is NOT acceptable for fulfillment of KYC norms?
 - A Voter ID card
 - B Ration card
 - C Residential certificate
 - D Income certificate

3 In fire fighting method 'Starvation" is

Model Questions

- A limitation of oxygen
- B pouring water
- C elemination of fuel
- D reduction of temperature
- 4 Head protection is done through
 - A helmet
 - B goggles
 - C gloves
 - D mask

Employability Skills - (NSQF) Model Questions

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Model Questions

Employability Skills - OSH & Environment Education

Model Questions

- 5 The unsafe condition to work is
 - A oily floor
 - B good light
 - C propertool
 - D adequate ventilation
- 6 To put off fire due to electrical sources, Class C fire extinguisher uses
 - A water
 - B carbon dioxide
 - C drypowder
 - D foam
- 7 Risk management involves
 - A identifying and monitoring risk
 - B hiring an employee with the job of managing risk
 - C eliminating all workplace hazards
 - D identify risk, assessing risk and eleminate/control riks.
- 8 Which one of the following is not an ergonomic hazard?
 - A Awkward position
 - B Poor house keeping
 - C Emotional disturbances
 - D Wrong layout of machinery
- 9 ABC of first aid stands for
 - A Air way, Bleeding and Circulation
 - B Air way, Breathing and Circulation
 - C Airway, Bleeding and Compression
 - D Airway, Breathing & Compression
- 10 What should NEVER be placed on a burn?
 - A Oil
 - B Water
 - C Damped cloth
 - D Dry sterile dressing
- 11 The organisms which directly or indirectly depend upon green plant for the source of food are called
 - A abiotic
 - B producer
 - C consumer
 - D decomposer

- 12 What is the expansion of CFC?
 - A Chloro Fluro Carbons
 - B Carbon Fibre Composite
 - C Cold Fusion Component
 - D Chlorine Fibre Carbons
- 13 Earthquake is measured with an instrument called
 - A telegraph
 - B seismograph
 - C oscillograph
 - D bargraph
- 14 Which one is a man induced hazards?
 - A Landslide
 - B Cyclone
 - C Volcano
 - D Earth quake
- 15 Which one is a non-renewable energy?
 - A Solar
 - B Wind
 - C Coal
 - D Rain
- 16 Which one of the following is not part of 3 R's?
 - A Reduce
 - B Recycle
 - C Regenerate
 - D Reuse
- 17 Ozone layer is made up of
 - A one oxygen atom (O)
 - B two oxygen atoms (O_2)
 - C three oxygen atoms (O_3)
 - D four oxygen atoms (O_4)
- 18 Below food relation is called "Grass → Deer → Lion → Decomposer"
 - A food web
 - B food chain
 - C food process
 - D food pyramid

Employability Skills - (NSQF) Model Questions

Employability Skills - OSH & Environment Education

Model Questions

MODEL QUES

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- 19 In water cycle, the transformation of water vapour to liquid water droplets is called
 - A evaporation
 - B condensation
 - C transpiration
 - D precipitation

20 Example of standing water is

- A lake
- B stream
- C river
- D canal

- 21 Pre-chlorination is a process mainly used in?
 - A Sewage treatment
 - B Boiler water treatment
 - C Drinking water treatment
 - D Industrial water treatment
- 22 The minimum water to be used for washing, cleaning of toilet, domestic comes under
 - A Industrial water conservation
 - B Agricultural water conservation
 - C Urban water conservation
 - D Thermal Electrical water conservation

Employability Skills - Labour Welfare Legislation

on Model Questions

- 1 Under Factories Act, the workers weekely hours should not exceed more than
 - A 60 hours
 - B 50 hours
 - C 48 hours
 - D 40 hours
- 2 As per factories act, 1948 canteen should be provided in the factory if, workers are more than
 - A 100
 - B 250
 - C 500
 - D 1000
- 3 When was Apprentice Act enacted?
 - A 1948
 - B 1961
 - C 1928
 - D 1950
- 4 What is the expansion of ILO?
 - A International Labour Organization
 - B Indian Labour Organization
 - C Indian Labour Occupation
 - D International Labour Occupation

- 5 Which one of the following remuneration is NOT included with the wages as per the "payment of wages of act"?
 - A Dearness allowance
 - B Medical allowance
 - C City compensation allowance
 - D Any bonus amount
- 6 Which scheme of 'Act' provides health insurance requirements for workers?
 - A Factories Act
 - B Plantation Labour Act
 - C Employee's Compensation Act
 - D Employee's State Insurance Act
- 7 In which case, withdrawal of EPF is not possible before attaining age of 55?
 - A Transfer from one department to another
 - B At the time of termination of service
 - C Retirement on account of total disablement
 - D Migration to other countries for permanent settlement.
- 8 ESI Act does NOT apply to employees, who are
 - A warehouse employees
 - B members in armed force
 - C residential hotel employees
 - D printing establishment employees

Employability Skills - (NSQF) Model Questions

- 9 What is the minimum percentage of employee's contribution from the basic salary as per EPF Act, 1962?
 - A 8.5%
 - B 9.0%
 - C 12.0%
 - D 12.5%
- 10 When was workmen compensation act was implemented?
 - A 1924
 - B 1948
 - C 1968
 - D 1973

Employability Skills - Quality Tools

- 1 ISO has defined quality (Q) in terms of performance (P) and expectation (E) as
 - A Q=P×E
 - B Q = $\frac{P}{E}$
 - C Q = $\frac{E}{P}$

D Q =
$$\frac{P-E}{P}$$

- 2 Function of "Pareto Diagram" quality tool is to
 - A narrow the problem area
 - B make data collection easy
 - C assess factors for problem
 - D indicate shape of distribution
- 3 "KAIZEN" means
 - A self discipline
 - B preventive maintenance
 - C sorting out
 - D continuous improvement
- 4 In PDCA cycle, "P" stands for
 - A process
 - B plan
 - C problem
 - D procedure

- 11 How many days annual leave is entitled for a worker as per factories Act for 240 days of work
 - A 12
 - B 15
 - C 10
 - D 20
- 12 Which is the Act vulnerable to labour exploitation with no bargaining power
 - A Apprentice Act
 - B Employee insurance Act
 - C WAGE ACT 1936
 - D Minimum wages bill

Model Questions

- 5 Fishbone chart is also called as
 - A cause and effect diagram
 - B scatter diagram
 - C control chart
 - D histogram
- 6 The expansion of QMS is
 - A Quality Management Standard
 - B Quality Measurement Standard
 - C Quality Measurement System
 - D Quality Management System
- 7 Another name of quality circle is
 - A large group
 - B standard group
 - C productivity circle
 - D entrepreneur circle
- 8 Head quarter of ISO is at
 - A Sydney (Australia)
 - B Geneva (Switzerland)
 - C California (USA)
 - D London (UK)
- 9 Total number of popular quality tools is
 - A 9
 - B 8
 - C 7
 - D 6

Employability Skills - (NSQF) Model Questions

Employability Skills - Quality Tools

Model Questions

10 What does "SERI" stand for?

- A Sorting out
- B Self discipline
- C Standardization
- D Systematic arrangement
- 11 What is the name used for word "waste"?
 - A MUDA
 - B MURA
 - C MURI
 - D MUSA
- 12 What is the last step in ISO 9001 registration?
 - A Correctness & Prevention action
 - B Management review meeting
 - C Internal audit
 - D Certification & Audit
- 13 Quality guru "Dr. J.M. Juran" defined quality as
 - A quality is fitness for use
 - B quality is value for money
 - C quality should be aimed at customer need
 - D quality as the conformance to requirement
- 14 Which one of the following is NOT a characteristic of quality?
 - A Quality of design
 - B Quality of non-conformance
 - C Quality of assurance
 - D Quality of control
- 15 The PDCA means
 - A Plan, Develop, Control, Act
 - B Plan, Do, Check, Act
 - C Plan, Develop, Check, Act
 - D Plan, Do, Control, Act

- 16 In house keeping 5^s concept which 'S' stands for clearliness?
 - A SEIRI
 - **B** SEITON
 - C SEISO
 - D SHITSUKE
- 17 Which S of 5^s concept stands for arranging "A place for everything and everything in its place".
 - A SEIRI
 - **B** SEITON
 - C SEISO
 - D SHITSUKE
- 18 In ISO-9001 documentation, which is the first level of document?
 - A Quality procedures
 - B Quality manual
 - C Work instruction
 - D Records
- 19 Though there are many definitions on 'QUALITY' the concept of quality as per modern (latest) requirement is
 - A To produce as per standared specification
 - B To produce a component with a durability
 - C To achieve customer satisfaction
 - D To produce a component at cheaper cost
- 20 What is important element in ISO-9001 quality system that totally leads to overall quality improvement?
 - A Quality audit and MRM for effecting implementation of QMS
 - B Improving the design of a product
 - C Improving the skill of a worker
 - D improving the machineries

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Key to Questions

Entrepreneurship Skills							Lab	our	Welfare	Le	gislation	I				
1	В	2	С	3	A	4	С	1	С	2	В	3	В	2	4	A
5	В	6	С	7	С	8	А	5	D	6	С	7	А	8	3	В
9	С	10	В	11	D	2	А	9	С	10	А	11	А	/	12	С
13	В	14	С	15	D	16	А									
17	С	18	А	19	В	20	D	Qua	lity	Tools						
Pro	ductivity	/						1	В	2	А	3	D	2	4	В
								5	А	6	D	7	С	3	3	В
1	С	2	А	3	В	4	D	9	С	10	А	11	А		12	D
5	D	6	А	7	В	8	С	13	А	14	В	15	В		16	С
9	В	10	А	11	С	12	В	17	В	18	В	19	С	2	20	А
13	С	14	В	15	А	16	D									
OSł	l & Envi	ron	ment Edu	ıcat	ion											
1	D	2	В	3	С	4	А									
5	А	6	В	7	D	8	С									
9	В	10	А	11	С	12	А									
13	В	14	А	15	С	16	С									
17	С	18	В	19	В	20	А									
21	С	22	С													

Employability Skills - (NSQF) Model Questions