

ALAGAPPA UNIVERSITY

(Accredited with A+ Grade by NAAC (CGPA: 3.64) in the Third Cycle), Graded
as Category-I University and granted autonomy by MHRD-UGC)

DIRECTORATE OF COLLABORATIVE PROGRAMMES



Diploma in Fire and Industrial Safety

Regulations and Syllabus

[For those who join the Course in July 2023 and after]

CHOICE BASED CREDIT SYSTEM

GENERAL INSTRUCTIONS AND REGULATIONS

Diploma in Fire and Industrial safety conducted by Alagappa University, Karaikudi, Tamil Nadu through its Collaborative Institution. Applicable to all the candidates admitted from the academic year **2023** onwards.

1. ELIGIBILITY:

A pass in the SSLC Examination conducted by the Government of Tamil Nadu, or an examination accepted as equivalent thereto by the Syndicate. Candidate for admission to **Diploma in Fire and Industrial Safety** shall be required to have passed qualifying examination.

2. Admission:

Admission based on the marks in the qualifying examination.

3. Duration of the course:

The course shall extend over a period of **three years** under Semester pattern

4. Standard of Passing and Award of Division:

- a. Students shall have a minimum of 40% of total marks of the University examinations in each subject. The overall passing minimum is 40% both in external and aggregate of Continuous Internal Assessment and external in each subject.
- b. The minimum marks for passing in each theory / Lab course shall be 40% of the marks prescribed for the paper / lab.
- c. A candidate who secures 40% or more marks but less than 50% of the aggregate marks prescribed for three years taken together, shall be awarded **THIRD CLASS**.
- d. A candidate who secures 50% or more marks but less than 60% of the aggregate marks prescribed for three years taken together, shall be awarded **SECOND CLASS**.
- e. A candidate who secures 60% or more of the aggregate marks prescribed for three years taken together, shall be awarded **FIRST CLASS**.
- f. The Practical / Project shall be assessed by the two examiners, by an internal examiner and an external examiner.

5. Continuous internal Assessment:

- a. Continuous Internal Assessment for each paper shall be by means of Written Tests, Assignments, Class tests and Seminars
- b. **25 marks** allotted for the Continuous Internal assessment is distributed for Written Test, Assignment, Class test and Seminars.
- c. One Internal Tests of 2 hours duration may be conducted during the semester for each course / subject and the best marks may be considered and one Model Examination will be conducted at the end of the semester prior to University examination. Students may be asked to submit at least five assignments in each subject. They should also participate in Seminars conducted for each subject and marks allocated accordingly.
- d. Conduct of the continuous internal assessment shall be the responsibility of the concerned faculty.
- e. The continuous internal assessment marks are to be submitted to the University at the end of every year.
- f. The valued answer papers/assignments should be given to the students after the valuation is over and they should be asked to check up and satisfy themselves about the marks they have scored.

- g. All mark lists and other records connected with the continuous internal assessments should be in the safe custody of the institution for at least one year after the assessment.

6. Attendance:

- a. Students must have earned 75% of attendance in each course for appearing for the examination.
- b. Students who have earned 74% to 70% of attendance to be applied for condonation in the prescribed form with the prescribed fee.
- c. Students who have earned 69% to 60% of attendance to be applied for condonation in the prescribed form with the prescribed fee along with the medical certificate.
- d. Students who have below 60% of attendance are not eligible to appear for the examination. They shall re-do the semester(s) after completion of the programme.

7. Examination:

Candidate must complete course duration to appear for the university examination. Examination will be conducted with concurrence of Controller of Examinations as per the Alagappa University regulations. **University may send the representatives as the observer during examinations.** University Examination will be held at the end of the each semester for duration of 3 hours for each subject. Certificate will be issued as per the AU regulations. **Hall ticket will be issued to the 1st year candidates and upon submission of the list of enrolled students along with the prescribed course fee subsequent 2nd and 3rd year hall tickets will be issued.**

8. Miscellaneous

- a. Each student possess the prescribed text books for the subject and the workshop tools as required for theory and practical classes.
- b. Each student is issued with an identity card by the University to identify his / her admission to the course
- c. Students are provided library and internet facilities for development of their `studies.
- d. Students are to maintain the record of practicals conducted in the respective laboratory in a separate Practical Record Book and the same will have to be presented for review by the University examiner.
- e. Students who successfully complete the course within the stipulated period will be awarded the degree by the University.
- f. The Internship / Project (any other viva-voce) where external examiner is assigned from the university, there may be changes in the exam dates as per the availability of the External Examiner.

9. Fee structure

Course fee shall be as prescribed by the University and 50% of the course fee should be disbursed to University. Special fees and other fees shall be as prescribed by the Institution and the fees structure must be intimated to the University. Course fees should be only by Demand draft / NEFT and AU has right to revise the fees accordingly.

Pattern	Course Fee payment deadline
Semester	Fee must be paid before 10 th September of the academic year

10. Other Regulations:

Besides the above, the common regulation of the University shall also be applicable to this programme.

DIPLOMA IN FIRE AND INDUSTRIAL SAFETY 3 YEARS

	Course Code	Title of the Paper	T/P	Cr.	Hrs./Week	Max. Marks		
						Int.	Ext.	Total
Sem I	50311	Basics of Fire Safety	T	5	6	25	75	100
	50312	Occupational Health and Safety Management	T	5	6	25	75	100
	50313	Emergency Response (ERP) Practical	P	4	8	25	75	100
	50314	Basic Fire Fighting Practical	P	4	8	25	75	100
	50315	Value Education Practical	P	2	2	25	75	100
		Total		20	30	125	375	500
Sem II	50321	Safety on Electrical and Chemical Hazards	T	5	5	25	75	100
	50322	Food Safety	T	5	5	25	75	100
	50323	Emergency First Aid Practical	P	4	10	25	75	100
	50324	Environmental Safety Practical	P	4	10	25	75	100
		Total		18	30	125	375	500
Sem III	50331	Construction Safety	T	5	5	25	75	100
	50332	Accident Investigation and Reporting	T	5	5	25	75	100
	50333	Safety at Work at Height Practical	P	4	10	25	75	100
	50334	Computer Applications Practical	P	4	10	25	75	100
		Total		18	30	100	300	400
Sem IV	50341	Hazard Identification Risk Assessment and Risk Control	T	5	5	25	75	100
	50342	EHS Law	T	5	5	25	75	100
	50343	Risk Assessment Practical	P	4	6	25	75	100
	50344	Industrial Safety Practical	P	4	6	25	75	100
	50345	Industrial Internship	I	4	8	25	75	100
		Total		22	30	125	375	500
Sem V	50351	Safety Inspection and Audit	T	5	5	25	75	100
	50352	Safety in Oil and Gas Industries	T	5	5	25	75	100
	50353	Confined space Entry, Working, Exit and Rescue Operation Practical	P	4	6	25	75	100
	50354	PPE Practical	P	4	6	25	75	100
	50355	Project Phase - I	PR	5	8	25	75	100
			Total		23	30	125	375
Sem VI	50361	Process Safety Management	T	5	5	25	75	100
	50362	Behaviour Based Safety	T	5	5	25	75	100
	50363	EHS Observation Practical	P	4	10	25	75	100
	50364	Project Phase-II	PR	5	10	25	75	100
		Total		19	30	100	300	400
				120	180	700	2100	2800

DIPLOMA in (F&IS) I -Semester					
Core	Course code: 50311	Basics of Fire Safety	T	Credits: 5	Hours: 6
Course Objectives	1.To understand the basic theory of fire chemistry, the development of fire and its characteristics, and about different types of fire. 2.To study about the product of combustion and their characteristics. 3. To Identify the purpose for head protection, why it's important, and how hardhats protect an employee's head 4. To Understand employer and employee responsibilities for safety 5. To Describe the Hierarchy of Control and the role of personal protective equipment (PPE)				
UNIT- 1	INTRODUCTION OF BASICS SAFETY:				
Basics of fire – stage of fire- heat transfer methods- identify the ignition source - class of fire, firefighting methods-flash point, auto ignition temperature-fire point-BLEVE. PPE- Introduction safety, hazards- risk-accident –incident- near miss, dangerous occurrence –basics of PPE- types of PPE.					
UNIT- 2	HEAD AND EYE PROTECTION PPE AND FIRE EXTINGUISHER				
Introduction of head protection –hazards- safety helmet and types –parts and construction of safety helmet-care and maintenance- safety glass and goggles differentiate – potential eye hazards in industry- types of goggles. Classification of fire- fire extinguisher –types of fire extinguisher-water, co2, DCP, FOAM, halogenated agent-fire extinguisher operating methods and precaution steps.					
UNIT-3	HAND AND LEG PROTECTION PPE AND SPRINKLER SYSTEMS				
Introduction of hand protection-injuries –hazards-emergency measures-prevention of hand injuries-types of hand protection-selection- use and care of hand protection-leg protection important-hazards-protective measures-safety shoe-maintenance and care. water based sprinkler system- sprinkler heads-wet pipe system-water supply and distribution-piping and valves –water flow alarm – dry pipe system-sprinkler system inspection.					
UNIT-4	ALARM AND DETECTION SYSTEM AND SKIN PROTECTION				
NFPA 72 classification of fire alarm system-power supplies for alarm system-initiation device-basics consideration for installation-types of detectors- heat detector –smoke detector-radiant energy sensing detectors.Introduction of skin protections-causes – physical hazards –chemical substances-preventive measure – change cloths often-types of body suit -remove irritant- take shower-protective creams.					
UNIT-5	RESPIRATORY PROTECTION AND SPECIAL WORKPLACE HAZARDS				
Introduction-hazards-oxygen deficiency- harmful contaminants-smoke and fumes-spray and mists-gases and vapors-respirators- color code canister-air purifying respirator-self contained breathing apparatus –selection-use and fit. Flammable and combustible liquid –storage and transportation –loading and unloading-hot work.					
References:					
NFPA Fire protection Handbook – 21 st edition – NFPA - 2023 Principles of fire safety engineering – 2 nd edition – Das Akhil kumar – PHL learning Pvt.Ltd – 2020. Fire Officer – principles and practice – Michael J.Ward – NFPA – 2020. Head, Eye, and Face Personal Protective Equipment New Trends, Practice and Applications - Katarzyna Majchrzycka - CRC Press – 2023. Personal Protective Equipment – OSHA – 2023.					
Related online content (MOOC, Swayam,NPTEL, Website etc.) https://onlinecourses.nptel.ac.in/noc20_mg43/preview https://archive.nptel.ac.in/courses/110/105/110105094/					
Course outcomes					Knowledge level
CO-1	To Formulate the water requirement and the pump capacity for fire fighting and understand the basic fire ground operations.				K6
CO-2	To Classify different types of fire protection systems/ installations in oil and gas industry.				K2
CO-3	To identify the cost associated with PPE and describe the advantages and disadvantages of PPE and engineering controls				K3
CO-4	To Describe the evaluation process of determining a successful PPE program				K1
CO-5	To Define the role of PPE in training and education				K1

On what level it correlated with COs & POs -based on that we have to give marks
 Mapping Course Outcome Vs Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	M(2)	L(1)	M(2)	M(2)	L(1)	L(1)	L(1)	L(1)	M(2)
CO2	M(2)	S(3)	M(2)	M(2)	S(3)	L(1)	M(2)	L(1)	L(1)	S(3)
CO3	L(1)	L(1)	L(1)	M(2)	M(2)	L(1)	L(1)	L(1)	M(2)	S(3)
CO4	M(2)	S(3)	M(2)	M(2)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)
CO5	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	L(1)	M(2)	M(2)	S(3)
W.AV	2	2.2	1.6	2	2.2	1.4	1.4	1.4	1.6	2.6

S –Strong (3), M-Medium (2), L- Low (1)

Mapping Course Outcome Vs Programme Specific outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M(2)	M(2)	L(1)	M(2)	M(2)
CO2	M(2)	S(3)	M(2)	M(2)	M(2)
CO3	M(2)	M(2)	L(1)	M(2)	M(2)
CO4	M(2)	L(1)	M(2)	M(2)	M(2)
CO5	L(1)	M(2)	L(1)	M(2)	S(3)
W.AV	1.8	2	1.4	2	2.2

S –Strong (3), M-Medium (2), L- Low (1)

DIPLOMA in (F&IS) I–Semester

Core	Course code: 50312	Occupational Health & Safety Management	T	Credits: 5	Hours: 6
Course Objectives	1. To teach the significance of occupational health and hygiene. 2. To learn the fundamental principles of first aid. 3. To Gain an historical, economic, and organizational perspective of occupational health & first aid. 4. To identify the components needed to provide a safe and healthful work environment 5. To acquired knowledge and skills needed to identify workplace problems and advance safe work				
UNIT I	OCCUPATIONAL HAZARD AND CONTROL PRINCIPLES				
<p>Concept and spectrum of health- functional units and activities of occupational health services occupational and work related disease- Levels of prevention of diseases - notifiable occupational diseases such as silicosis, asbestosis, pneumoconiosis, siderosis, anthracosis, aluminosis and anthrax - Lead-Nickel, chromium and manganese toxicity- gas poisoning (such as CO, ammonia, coal and dust), their effects and prevention - Industrial toxicology - local and systemic and chronic effects, temporary and cumulative effects - threshold limit values, calculation of TLVs - carcinogens, mutagens, teratogens. Instruments for Radiation detection and measurement. Early recognition of radiation hazard. Personal monitoring devices, Medical support. Hazards associated with the following radiations and preventive measures- Laser, infra-red, ultra violet and ELF.</p>					
UNIT II	PHYSICAL HAZARD MEASUREMENT, EVALUATION AND CONTROL				
<p>Recognition, evaluation and control of physical hazards. Vibration - description and measurement of vibration. Vibration control methods. Effects of whole-body vibration on human body and control measures. Noise- noise measurement, evaluation, noise control methods -hearing loss - causes - Biological effects of noise exposure. Thermal stress - heat disorders and health effects such as heat exhaustion, heat cramp etc. WBGT index, acclimatization. Ventilation systems - purpose of ventilation-general principles ventilation requirements. Physiological and comfort level. Natural ventilation - Dilution ventilation - Mechanical ventilation - Local exhaust ventilation – Ventilation measuring instruments. Fundamentals of hood and duct designs. Standards on ventilation. Purpose of lighting. Advantages of good illumination. Lighting and the work. Sources and kinds of artificial lighting principles of good illumination. Design of lighting installation. Maintenance. Lighting and colour. Standards on lighting and illuminations.</p>					
UNIT III	PRINCIPLES OF FIRST AID				
<p>First Aid principles-Role of the first aider-sequence of action on arrival at scene. Vital signs-breathing - pulse. Introduction to the body-basic anatomical terms-body cavities-head- cranium - thorax- abdomen and pelvis. Biomechanics - Structure and functions of musculoskeletal systems, tendons, ligaments, fascia, bone, muscles, joints and basic mechanisms. Fainting-recognition management- aftercare. Diabetes - hypoglycemia – hyper glycaemia- management. Seizures (epileptic fits, convulsions) features-management, stroke. Head injuries-fractures of the base vault and sides of skull.</p>					
UNIT IV	FIRST-AID PRACTICE IN INDUSTRY				
<p>The circulatory system-heat attack-chest compression- CPR. Shock -causes - signs and symptoms - management of shock. Eye-eye injuries-foreign body in eye-eye trauma-corrosive chemical in eye arc eye. Wounds-bleeding-classification-types of wounds-case of wounds- bleeding from specialists. Fractures-classification of fractures-principles of immobilization- sprains and dislocation. Broad and narrow fold bandages-hand bandages-slings. The skin. Burns-rule of nines-pure thermal burns. Electric burns. Chemical burns. Radiation burns. Cold burns. Poisoning. Physical fitness. Lifting -casualty handling. Use of stretchers.</p>					

UNIT V	OCCUPATIONAL AND PSYCHOLOGICAL HAZARDS
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Elements of Industrial Psychology-Mental Health in Industries- Organisational Behaviour, Motivational Theory, Job Satisfaction Value system, Habits, Drug Abuse-Alcoholism in Industry, Communications, Organising Health education and Training Programme for employees, Psychological Hazards - Workplace Stress- General Adaptation Syndrome Eustress –Distress Diseases/Disorders related to Work stress- Psychosomatic disorders. Managing Work-stress in industry- Individual responsibilities - Employers Responsibilities. Psychological Counseling of employees- Employees Assistance Programme, Behaviour based Safety.,

References: -

Industrial and Occupational Health - S.K. Haldar - CBS Publishers and Distributors Pvt. Ltd. – 2023.
Occupational Safety, Health And Working Conditions Code, 2020 - Bare Act - Universal Lexis Nexis - 2023 Edition.
NEBOSH IGC : International General Certificate In Occupational Health and Safety - Subhash Kumar – 2023.
Occupational Safety and Health for Technologists, Engineers, and Managers, Global Edition - David Goetsch – Pearson – 2014.

Related online content (MOOC, Swayam, NPTEL, Website etc.)

https://onlinecourses.nptel.ac.in/noc21_ce16/preview

<https://archive.nptel.ac.in/courses/105/102/105102206/>

Course outcomes		Knowledge level
CO-1	Understand the concept and spectrum of health – functional units and activities of occupational health service.	K1
CO-2	Identify physical chemical and biological hazards in the work environment and its control measures.	K2
CO-3	Demonstrate the principles of first aid.	K4
CO-4	Understand anatomy and functions of different human systems.	K5
CO-5	Identify the decisions required to maintain protection of the environment, home and workplace as well as personal health and safety.	K6

On what level it correlated with COs & POs -based on that we have to give marks

Mapping Course Outcome Vs Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M(2)	L(1)	L(1)	M(2)	L(1)	M(2)	L(1)	M(2)	L(1)	L(1)
CO2	L(1)	M(2)	M(2)	M(2)	L(1)	M(2)	M(2)	M(2)	M(2)	M(2)
CO3	L(1)	M(2)	L(1)	M(2)	L(1)	M(2)	L(1)	M(2)	L(1)	M(2)
CO4	L(1)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	L(1)	M(2)	L(1)
CO5	M(2)	L(1)	M(2)	L(1)	L(1)	M(2)	L(1)	L(1)	L(1)	M(2)
W.AV	1.4	1.6	1.6	1.5	1.2	1.8	1.4	1.6	1.4	1.6

S –Strong (3), M-Medium (2), L- Low (1)

Mapping Course Outcome Vs Programme Specific outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M(2)	M(2)	M(2)	M(2)	M(2)
CO2	M(2)	M(2)	M(2)	S(3)	M(2)
CO3	L(1)	S(3)	M(2)	M(2)	M(2)
CO4	M(2)	M(2)	L(1)	M(2)	M(2)
CO5	M(2)	M(2)	M(2)	L(1)	M(2)
W.AV	1.8	2.2	1.8	2	2

S –Strong (3), M-Medium (2), L- Low (1)

DIPLOMA in (F&IS) I -Semester

Core	Course code:50313	EMERGENCY RESPONSE PRACTICAL	P	Credits: 4	Hours: 8
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OBJECTIVES

- 1.To Impart the Fire Fighting & Emergency response to the students
- 2.To Express the Evacuating procedure and emergency response procedures

EXPERIMENTS

1. Identification of classes of fire.
2. Learning the methods of firefighting.
3. Identification of appropriate fire extinguishers.
4. Evacuating workforce by means of emergency siren/alarm.
5. Steps for emergency planning and preparedness.
6. Emergency response team and their response.
7. Headcount procedures.
8. Fire mock drill & rescue operation.
9. Different types of sirens and siren coding.
10. Debriefing and resuming operations.

REQUIREMENTS

- 1.All type of Fire extinguishers
- 2.Emergency Services
- 3.Suitable water and sand buckets
- 4.All other required safety equipments for fire demo
- 5.Provision of Windsock

OUTCOMES

The students will be able to

- 1.To Identify the Fire classifications and fire fighting methods.
- 2.To Practice Fire Rescue and evacuation methods with ERP procedures
- 3.To Operate fire mock drill with Headcount arrangements
- 4.To classify Siren codings and simplify resuming operations.

REFERENCE

- 1.Guide book on Fire safety – National Safety Council-2014
- 2.Guide book-Designing for Fire safety-National safety council-2015
- 3.Practical Guide on SHE-Volume 4-National safety council-2010

DIPLOMA in (F&IS) I -Semester					
Core	Course code: 50314	BASIC FIRE FIGHTING PRACTICAL	P	Credits: 4	Hours: 8

OBJECTIVES:

- 1.To Impart the Fire Fighting & Emergency response to the students
- 2.To Express the Evacuating procedure and emergency response procedures

EXPERIMENTS:

1. Identification of classes of fire.
2. Learning the methods of fire fighting.
3. Identification of appropriate fire extinguishers.
4. Evacuating workforce by means of emergency siren/alarm.
5. Steps for emergency planning and preparedness.
6. Emergency response team and their response.
7. Headcount procedures.
8. Fire mock drill & rescue operation.
9. Different types of sirens and siren coding.
10. Debriefing and resuming operations.

REQUIREMENTS

- 1.All type of Fire extinguishers
- 2.Emergency Services
- 3.Suitable water and sand buckets
- 4.All other required safety equipments for fire demo
- 5.Provision of Windsock

OUTCOMES

The students will be able to

- 1.To Identify the Fire classifications and fire fighting methods.
- 2.To Practice Fire Rescue and evacuation methods with ERP procedures
- 3.To Operate fire mock drill with Headcount arrangements
- 4.To classify Siren codings and simplify resuming operations.

REFERENCE

- 1.Guide book on Fire safety – National Safety Council-2014
- 2.Guide book-Designing for Fire safety-National safety council-2015
- 3.Practical Guide on SHE-Volume 4-National safety council-2010

DIPLOMA in (F&IS) I -Semester					
SEC - I	Course code: 50315	VALUE EDUCATION	P	Credits: 2	Hours: 2
Course Objectives	1.To familiarize the basic information about value education. 2.To educate on role of value education. 3.To learn about value crisis. 4.To provide knowledge about value education in college campus. 5.To learn about value education details in society.				
Unit I	Definition & need for value Education				
Definition – Need for value Education – How important human values are – humanism and humanistic movement in the world and in India – Literature on the teaching of values under various religions like Hinduism, Buddhism, Christianity, Jainism, Islam, etc. Agencies for teaching value education in India – National Resource Centre for Value Education – NCERT– IITs and IGNOU.					
Unit II	Vedic Period				
Vedic Period – Influence of Buddhism and Jainism – Hindu Dynasties – Islam Invasion – Moghul invasion – British Rule – culture clash – Bhakti cult – social Reformers – Gandhi – Swami Vivekananda – Tagore – their role in value education.					
Unit III	Value Crisis – After Independence				
Independence – democracy – Equality – fundamental duties – Fall of standards in all fields – Social, Economic, Political, Religious and Environmental – corruption in society Politics without principle – Commerce without ethics – Education without Character – Science without humanism – Wealth without work – Pleasure without conscience – Prayer without sacrifice – steps taken by the Governments – Central and State – to remove disparities on the basis of class, creed, gender.					
Unit IV	Value Education on College Campus				
Transition from school to college – problems – Control – free atmosphere – freedom mistaken for license – need for value education – ways of inculcating it – Teaching of etiquettes – Extra-Curricular activities – N.S.S., N.C.C., Club activities – Relevance of Dr.A.P.J. Abdul Kalam’s efforts to teach values – Mother Teresa.					
Unit V	Project Work				
1. Collecting details about value education from newspapers, journals and magazines. 2. Writing poems, skits, stories centering around value-erosion in society. 3. Presenting personal experience in teaching values.Suggesting solutions to value – based problems on the campus.					
References <ol style="list-style-type: none"> 1. Satchidananda. M.K. (1991), “Ethics, Education, Indian unity and culture” – Delhi, Ajantha publications. 2. Saraswathi. T.S. (Ed) 1999. Culture”, Socialization and Human Development: Theory, Research and Application in India” – New Delhi Sage publications. 3. Venkataiah. N (ed) 1998, “Value Education” New Delhi Ph. Publishing Corporation. 					
Related online content (MOOC, Swayam, NPTEL, Website etc.)					
https://onlinecourses.swayam2.ac.in/cec20_ge19/preview					
https://onlinecourses.nptel.ac.in/noc22_ce70/preview					

Course outcomes		Knowledge level
CO-1	To define the basic concepts of value education.	K1
CO-2	To outline the knowledge about Vedic period and bakthi culture.	K2
CO-3	TO Discuss the value crisis after independence.	K4
CO-4	To explain the concepts of value education on college campus.	K5
CO-5	To compile the value education related details.	K6

DIPLOMA in (F&IS) II -Semester					
CORE 50321		SAFETY ON ELECTRICAL AND CHEMICAL HAZARDS	T	Credits: 5	Hours: 5
Course Objectives	1. To familiarize the basic information about electricity and hazards. 2. To educate on electrical hazard analysis. 3. To learn about protection from electrical hazards. 4. To provide technical knowledge in chemical exposure and safety. 5. To analyses the handling and storage of hazardous chemicals.				
Unit I	Basics of Electricity & Hazards of Electricity				
Introduction-Current-Voltage-Power-Resistance-Capacitor-Inductor - Ohm's Law -Types of Electrical Faults-Overloads -Short Circuits-Hazard Analysis-Shock-Arc- Blast - Body Parts & Effects of Shock- Heart, Pulmonary System - Indian Electricity Rules - Statutory Requirements from Electrical Inspectorate- International Standards on Electrical Safety-CPR.					
Unit II	Electrical Hazard Analysis				
Primary & Secondary Hazards - Shocks - Burns-Scalds Falls - Safety in the Use of Electricity Energy Leakage - Clearances & Insulation - Classes of Insulation - Voltage Classifications - Excess Energy - Current Surges - Over Current & Short Circuit Current- Heating Effects of Current - Electromagnetic Forces - Corona Effect - Static Electricity Sources - Electrical Causes of Fire & Explosion ionization - Spark & Arc - National Electrical Safety Code- Lightning Hazards -Lightning Arrestor -Earthing.					
Unit III	Minimizing Electrical Hazards				
Fuses -Circuit Breakers & Overload Relays - Protection Against Over Voltage & Under Voltage-Safe Limits of Amperage -Safe Distance from Lines - Short Circuit Protection- No Load Protection - Earth Fault Protection - Earthing Standards- Grounding - Equipment Grounding - Miniature Circuit Breaker - Earth Leakage Circuit Breaker - Ground Fault Circuit Interrupter - Electrical Guarding - Personal Protective Equipment's.					
Unit IV	Evaluating Hazards & Assessing Risks of Chemicals				
Introduction- Types of Chemicals - Routes of Entry Sources of Information-Toxicity- Flammable, Reactive & Explosive Hazards Physical Hazards Nano materials Biohazards- Radioactive Hazards - Labelling of Chemicals - Safety Data Sheet-Globally Harmonized System - Exposure Limits WHMIS Symbols -CLP Hazard Pictogram Toxicological Properties: LC50 & LD50 Flammable Limits - Atmospheric Monitoring-Health Surveillance.					
Unit V	Classification &Management of Hazardous Chemicals				
Classification of Hazardous Chemicals Green Chemistry Acquisition of Chemicals - Inventory & Tracking of Chemicals - Transportation of Hazardous Chemicals - Emergency Information Panel HAZCHEM Code - Personal Protective Equipment for Chemicals - Chemical Exposure Risk Assessment-Hierarchy of Risk Controls-General Guidelines for Safe Storage & Handling - Chemical Storage Tanks Design Considerations.					
References: -					
National Electrical Safety Code (NESC) 2023 Handbook - David J. Marne, John A. Palmer – Mc Graw Hill's – 2023.					
Central Electricity Regulatory Commission Rules And Regulations (Paperback, universal law publication) – 2023.					
Creating and Maintaining an Electrical Safety Structure: Duties of Management and Chief Responsible Electrical Specialists - Matthias Surovcik – 2022.					
Electric Safety: Practice And Standards - Nor Zaihar Yahaya, Excelic Press – 2019.					
Safety And Hazards Management In Chemical Industries – Prof. M.N. Vyas - Atlantic Publishers & Distributors Pvt Ltd – 2022.					
Hazardous Chemicals : Safety Management And Global Regulations – T.S.S. Dikshith – 2019.					
Related online content (MOOC, Swayam, NPTEL, Website etc.)					
https://onlinecourses.swayam2.ac.in/nou20_cs08/preview					

https://alison.com/course/chemical-safety-process-safety-managment		
Course outcomes		Knowledge level
CO-1	To define the fundamental concepts of electricity and risks.	K1
CO-2	To express the knowledge about analysis of electrical hazards.	K2
CO-3	To Discuss about electrical protection devices.	K4
CO-4	To evaluate the hazards and risks of chemicals.	K5
CO-5	To create the safe storage and transportation of chemicals.	K6

On what level it correlated with COs & POs -based on that we have to give marks

Mapping Course Outcome Vs Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M(2)	L(1)	L(1)	M(2)	L(1)	M(2)	L(1)	M(2)	L(1)	L(1)
CO2	L(1)	M(2)	M(2)	M(2)	L(1)	M(2)	M(2)	M(2)	M(2)	M(2)
CO3	L(1)	M(2)	L(1)	M(2)	L(1)	M(2)	L(1)	M(2)	L(1)	M(2)
CO4	L(1)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	L(1)	M(2)	L(1)
CO5	M(2)	L(1)	M(2)	L(1)	L(1)	M(2)	L(1)	L(1)	L(1)	M(2)
W.AV	1.4	1.6	1.6	1.5	1.2	1.8	1.4	1.6	1.4	1.6

S –Strong (3), M-Medium (2), L- Low (1)

Mapping Course Outcome Vs Programme Specific outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M(2)	M(2)	M(2)	M(2)	M(2)
CO2	M(2)	M(2)	M(2)	S(3)	M(2)
CO3	L(1)	S(3)	M(2)	M(2)	M(2)
CO4	M(2)	M(2)	L(1)	M(2)	M(2)
CO5	M(2)	M(2)	M(2)	L(1)	M(2)
W.AV	1.8	2.2	1.8	2	2

S –Strong (3), M-Medium (2), L- Low (1)

DIPLOMA in (F&IS) II -Semester

Core 50322		Food Safety	T	Credits: 5	Hours: 5
Course Objectives	1. To learn about food quality 2. To learn about physical, chemical and biological contamination in food and sanitation. 3. To learn the quality, challenges in food industry. 4. To learn basics about food quality auditing. 5. To learn the chemical, technological and toxicological aspects of food additives and food contaminants and the legal and socio-economic aspects of biotechnology				
UNIT I	FOOD QUALITY				
OBJECTIVE AND IMPORTANCE OF QUALITY CONTROL, CLASSIFICATION OF QUALITY ATTRIBUTES AND ITS ROLE IN FOOD QUALITY, QUALITY ASSESSMENT OF FOOD MATERIALS (FRUITS, CEREALS, MILK AND MEAT), TYPES OF QUALITY CHARACTERISTICS OF FOOD, METHODS USED FOR DETERMINATION OF THE QUALITY IN FOOD INDUSTRY, FACTORS IN INFLUENCING THE QUALITY OF FOOD, SAMPLE AND SAMPLING METHODS OF QUALITY EVALUATION.					
UNIT II	FOOD SANITATION				
FACTORS CONTRIBUTING TO PHYSICAL, CHEMICAL AND BIOLOGICAL CONTAMINATION IN FOOD CHAIN, PREVENTION AND CONTROL OF FOOD BORNE HAZARDS, DEFINITION AND REGULATION OF FOOD SANITATION, SOURCES OF CONTAMINATION, PERSONAL HYGIENE-FOOD HANDLERS, CLEANING COMPOUNDS, SANITATION METHODS AND PEST CONTROL, SANITATION AND SAFETY IN FOODSERVICES.					
UNIT III	FOOD SAFETY				
PRINCIPLES OF FOOD SAFETY AND QUALITY, QUALITY ASSURANCE, TOTAL QUALITY MANAGEMENT (TQM). GOOD AGRICULTURAL PRACTICES (GAP), GOOD MANUFACTURING PRACTICES (GMP), GOOD HYGIENIC PRACTICES (GHP), GOOD VETERINARY PRACTICE (GVP), RISK ANALYSIS, RISKASSESSMENT, RISK MANAGEMENT. APPLICATIONS OF HACCP IN FOOD SAFETY, CURRENT CHALLENGES TO FOOD SAFETY.					
UNIT IV	FOOD LAWS AND REGULATIONS				
BASIC CONCEPTS OF FOOD STANDARDS, ROLE OF NATIONAL REGULATORY AGENCIES: FOOD SAFETY AND STANDARDS ACT: SALIENT PROVISION AND PROSPECTS, FSSAI, PFA, CERTIFICATION- AGMARK, ISI (BIS). ROLE OF INTERNATIONAL REGULATORY AGENCIES: USDA, FDA, BRC, WHO, FAO, CODEX ALIMENTARIUS COMMISSION, WTO AGREEMENTS: SPS AND TBT AGREEMENTS, ISO AND ITS STANDARDS FOR FOOD QUALITY AND SAFETY (ISO 9000, ISO 17025, ISO 22000, AND ISO14000).					
UNIT V	FOOD SAFETY AUDITING				
FOOD SURVEILLANCE: INTERNATIONAL AND NATIONAL PRACTICES, PROCEDURE AND PROTOCOLS, FOOD ALERTS, TRACEABILITY AND FOOD PRODUCT RECALL. EXPORT AND IMPORT OF FOOD IN INDIA: INTRODUCTION, IMPORT AND EXPORT POLICIES, FDA IMPORT POLICY, EXPORT-IMPORT POLICY, EXPORT CONTROL SYSTEMS. IMPORT INTELLIGENCE AND ALERT SYSTEMS, PACKAGING AND LABELLING, SPECIFICATIONS AND CERTIFICATIONS.					
References					
Food Safety Management A Practical Guide For The Food Industry – Andersen – 2022.					
Food Safety and Standards Act, 2006, Rules & Regulations - Rajan Nijhawan – 2023.					
Food Safety Guide for FSO & FBO – Food Safety Officers & Food Business Operators – 2023.					
FSSAI CENTRAL FOOD SAFETY OFFICER (CFSO) PREPARATION BOOK – 2023.					
Related online content (MOOC, Swayam,NPTEL, Website etc.)					
https://onlinecourses.nptel.ac.in/noc21_ce16/preview					
https://archive.nptel.ac.in/courses/105/102/105102206/					
Course outcome					Knowledge level

CO-1	To Understand the food quality in food industry	K1
CO-2	To Identify the food additives and food contaminants and their chemical and toxicological properties.	K2
CO-3	To Recognize the effects of pests on food and the various methods for controlling them	K4
CO-4	To Attain knowledge about the national and international regulations for biosafety.	K5
CO-5	To Demonstrate an ability to recognize the environmental, social and ethical implications of biotech applications.	K6

On what level it correlated with COs & POs -based on that we have to give marks
Mapping Course Outcome Vs Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M(2)	L(1)	L(1)	M(2)	L(1)	M(2)	L(1)	M(2)	L(1)	L(1)
CO2	L(1)	M(2)	M(2)	M(2)	L(1)	M(2)	M(2)	M(2)	M(2)	M(2)
CO3	L(1)	M(2)	L(1)	M(2)	L(1)	M(2)	L(1)	M(2)	L(1)	M(2)
CO4	L(1)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	L(1)	M(2)	L(1)
CO5	M(2)	L(1)	M(2)	L(1)	L(1)	M(2)	L(1)	L(1)	L(1)	M(2)
W.AV	1.4	1.6	1.6	1.5	1.2	1.8	1.4	1.6	1.4	1.6

S –Strong (3), M-Medium (2), L- Low (1)

Mapping Course Outcome Vs Programme Specific outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M(2)	M(2)	M(2)	M(2)	M(2)
CO2	M(2)	M(2)	M(2)	S(3)	M(2)
CO3	L(1)	S(3)	M(2)	M(2)	M(2)
CO4	M(2)	M(2)	L(1)	M(2)	M(2)
CO5	M(2)	M(2)	M(2)	L(1)	M(2)
W.AV	1.8	2.2	1.8	2	2

S –Strong (3), M-Medium (2), L- Low (1)

DIPLOMA in (F&IS) II -Semester

Core 50323	EMERGENCY FIRST AID PRACTICAL	P	Credits: 4	Hours: 10
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COURSE OBJECTIVES

- 1.To understand cleaning and dressing procedures for injured
- 2.To Apply the applications of CPR as an immediate response procedure

EXPERIMENTS:

1. First aid for burn injuries.
2. First aid for eye injuries.
3. First aid for cuts and wounds.
4. First aid for electric shock.
5. First aid for chemical splashes on skin & eye.
6. First aid for muscular disorder.
7. First aid for fracture.
8. First aid for bleeding.
9. First aid for open – close complicated fractures.
10. First aid for heart attack.
11. First aid for poisoning

REQUIREMENTS:

1. First aid kit with valid medicines.
2. Stretcher and ambulance service.
3. Eye wash bottle and emergency shower.
4. List of emergency numbers to be displayed.
5. All other required safety & communication.

COURSE OUTCOMES:

- 1.To Outline First aid procedures for burn and eye injuries.
- 2.To SummariesFirst aid procedure for cuts, woundsand electric shock
- 3.To Simplify First aid procedure for chemical splashes on skin & eye
- 4.To InterpretFirst aid procedure for muscular disorder, fracture and bleeding
- 5.To Elaborate First aid for open – close complicated fractures, heart attack, poisoning

REFERENCES:

1. Guide book on fire & safety-National safety council-2014
2. Practical Guide on Safety, Health & Environment-Volume1-National safety council-2013

DIPLOMA in (F&IS) II -Semester				
Core 50324	Environmental Safety Practical	P	Credits: 4	Hours: 10

COURSE OBJECTIVE:

- Understand the fundamentals about EIA
- Describe critically the factors that influence the development of a EIA
- Know which operations and functions are suitable for dealing with EIA
- Practice data using for EIA and combine it in Workplace Environmental assessment.

EXPERIMENT:

1. **Screening:** The project plan is screened for scale of investment, location and type of development and if the project needs statutory clearance.
2. **Scoping:** The project's potential impacts, zone of impacts, mitigation possibilities and need for monitoring.
3. **Collection of baseline data:** Baseline data is the environmental status of study area.
4. **Impact prediction:** Positive and negative, reversible and irreversible and temporary and permanent impacts need to be predicted which presupposes a good understanding of the project by the assessment agency.
5. **Mitigation measures and EIA report:** The EIA report should include the actions and steps for preventing, minimizing or by passing the impacts or else the level of compensation for probable environmental damage or loss.
6. **Public hearing:** On completion of the EIA report, public and environmental groups living close to project site may be informed and consulted.
7. **Decision making:** Impact Assessment Authority along with the experts consult the project-in-charge along with consultant to take the final decision, keeping in mind EIA and EMP (Environment Management Plan).
8. **Monitoring and implementation of environmental management plan:** The various phases of implementation of the project are monitored.
9. **Assessment of Alternatives, Delineation of Mitigation Measures and Environmental Impact Assessment Report:** For every project, possible alternatives should be identified, and environmental attributes compared. Alternatives should cover both project location and process technologies.

COURSE OUTCOMES:

- To Creatively apply and integrate new knowledge (models/ analysis techniques) for EIA
- To Collect, analyze, and process data for EIA assessment
- To Use EIA tools and applications in Systematic Analysis
- To Plan and conduct field work in Workplace environment
- To Plan and run project-based activities in Work place.

REFERENCES:

1. Jain, R.K., Urban, L.V. and Stacey, G.S., Environment Impact Analysis, Von Nostrand Reinhold Company.
2. Lawrence, David P., Environmental Impact Assessment (Practical Solutions to Recurrent Problems), Wiley International, New Jersey.
3. MoEF, GoI, Environment Impact Assessment, Impact Assessment Division, January 2001 (Manual).
4. Water (Prevention and Control of Pollution) Act 1974. Air (Prevention and Control of Pollution) Act 1981.
5. Trivedi, P.R., Natural Resources Conservation, APH Publishing Corporation, New Delhi

DIP(F& IS) III -Semester

Core:50331	Construction safety	T	Credits:5	Hours:5
Pre-requisite	Basic Knowledge of Construction safety	Syllabus Revised	2023-2024	
Course Objectives	1. To know causes of accidents related to construction activities and human factors associated with these accident 2.To understand the construction regulations and quality assurance in construction 3. To have the knowledge in hazards of construction and their prevention methods 4.To know the working principles of various construction machinery 5. To gain knowledge in health hazards and safety in demolition work			

UNIT I ACCIDENTS CAUSES AND MANAGEMENT SYSTEMS

Problems impeding safety in construction industry- causes of fatal accidents, types and causes of accidents related to various construction activities, human factors associated with these accident –construction regulations, contractual clauses – Pre contract activates, preconstruction meeting -design aids for safe construction – permits to work – quality assurance in construction - compensation– Education and training

UNIT II HAZARDS OF CONSTRUCTION AND PREVENTION

Excavations, basement and wide excavation, trenches, shafts – scaffolding , types, causes of accidents, scaffold inspection checklist – false work – erection of structural frame work, dismantling –tunneling – blasting, pre blast and post blast inspection – confined spaces – working on contaminated sites – work over water - road works – power plant constructions – construction of high rise buildings.

UNIT III WORKING AT HEIGHTS

Fall protection in construction OSHA 3146 – OSHA requirement for working at heights, Safe access and egress – safe use of ladders- Scaffoldings , requirement for safe work platforms, stairways, gangways and ramps – fall prevention and fall protection , safety belts, safety nets, fall arrestors, controlled access zones, safety monitoring systems – working on fragile roofs, work permit systems, height pass – accident case studies.

UNIT IV CONSTRUCTION MACHINERY

Selection, operation, inspection and testing of hoisting cranes, mobile cranes, tower cranes, crane inspection checklist - builder’s hoist, winches, chain pulley blocks – use of conveyors – concrete mixers, concrete vibrators – safety in earth moving equipment, excavators, dozers, loaders, dumpers, motor grader, concrete pumps, welding machines, use of portable electrical tools, drills, grinding tools, manual handling scaffolding, hoisting cranes – use of conveyors and mobile cranes – manual handling.

UNIT V SAFETY IN DEMOLITION WORK

Safety in demolition work, manual, mechanical, using explosive - keys to safe demolition, pre survey inspection, method statement, site supervision, safe clearance zone, health hazards from demolition- Indian standard - trusses, girders and beams – first aid – fire hazards and preventing methods –interesting experiences at the construction site against the fire accidents

References

1. Handbook of OSHA Construction safety and health charles D. Reese and James V. Edison
2. Hudson, R.,”Construction hazard and Safety Hand book, Butter Worth’s, 1985.
3. Jnathead.Sime, “Safety in the Build Environment”, London, 1988.
4. V.J.Davies and K.Thomasin “Construction Safety Hand Book” Thomas Telford Ltd., London, 1990

Related online content (MOOC, Swayam,NPTEL, Website etc.)

https://onlinecourses.nptel.ac.in/noc21_ce16/preview

<https://archive.nptel.ac.in/courses/105/102/105102206/>

Course outcomes		Knowledge level
CO-1	To Recall the problems impeding safety in construction industries.	K1
CO-2	To Summarise the types and causes of accidents, and designing aids for safe construction.	K2
CO-3	To Categorisethe hazards during construction of power plant, road works and high rise buildings.	K4
CO-4	To Interpret construction regulations and Indian standards for construction and demolition work.	K5
CO-5	To Elaborate the safety procedure for working at heights during construction.	K6

DIP (F&IS) III -Semester

Core: 50332	Accident Investigation and Reporting	T	Credits:5	Hours:5
Pre-requisite	Basic Knowledge of Accident Investigation and reporting	Syllabus Revised	2023-2024	
Course Objectives	<ol style="list-style-type: none">1. To give basic information about accident and accident reporting system2. To learn about various accident theory3. To provide knowledge on hierarchy of accident prevention and control4. To provide technical knowledge about accident investigation and analysis5. To learn about computation of frequency and severity rate for industrial injuries.			

UNIT I ACCIDENT REPORTING SYSTEM

Accident-Causes of Accident-Types of Accident-Reportable and Non-Reportable accidents-accident record maintaining-accident internal management-accident reporting as per the factories act 1948-form no18-accident reporting as per the BOCW act 1996-form no 14.

UNIT II THEORIES OF ACCIDENT CAUSATION

Heinrich's Domino Theory-Heinrich domino-Process-critical issues-Human Factors theory-Accident/Incident Theory-Birds Triangle-system theory-Behavioral theory-bird's triangle-accident proneness theory-multiple causation theory.

UNIT III ACCIDENT PREVENTION AND RISK CONTROL

Hierarchy of risk control: Elimination, substitution, Engineering control, Administrative control, PPE. Preventive measure-control measure.

UNIT IV ACCIDENT INVESTIGATION

Introduction-what is accident investigation-process of accident investigation: collecting evidence & facts, analysis of evidence and facts, recommendation & reporting-methods of accident investigation-root cause analysis-Fish Bone Diagram-systematic cause analysis technique (SCAT)-Accident Analysis and Barrier Function (AEB).

UNIT V METHOD FOR COMPUTATION OF FREQUENCY AND SEVERITY RATES FOR INDUSTRIAL INJURIES & CLASSIFICATION OF INDUSTRIAL ACCIDENTS

Accident- fatal-disabling injury-reportable disabling injury-days of displacement (cost time)-partial displacement-total displacement-man hours worked-classification of accidents-assessment of work injury-computation of frequency, severity, incident rates.

References

1. Accident Prevention Manual for Business and Industry Administration and Programs, 13 th edition
a. ISBN number is 978-0-87912-280-5
2. 11/2 – 2 inch 3 ring binder with pockets
b. Notebook paper for binder
c. Organization of notebook; contents should include:
3. Cover page with first and last name - Title of course - Day and time of weekly class meeting
Dividers labeled, syllabus, PPT. lectures, study questions, handouts, exam

Related online content (MOOC, Swayam,NPTEL, Website etc.)

https://onlinecourses.nptel.ac.in/noc22_mg97/preview

<https://freevideolectures.com/course/4411/nptel-industrial-safety-engineering/47>

Course outcomes		Knowledge level
CO-1	To define the fundamental concept of accident reporting system	K1
CO-2	To compare various accident caution theory	K4
CO-3	To Discuss about principle of accident prevention	K6
CO-4	To Explain the methods for accident investigation	K5
CO-5	To Evaluate the computation of frequency and severity for industrial injuries	K5

DIPLOMA in (F&IS) III -Semester

Core:50333	SAFETY AT WORK AT HEIGHT PRACTICAL	P	Credits: 4	Hours: 10
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OBJECTIVES:

- 1.To Provide Safety in Work at Height to students
- 2.To Impart PTW for Work height with illustrations to students.

EXPERIMENTS:

- 1.100% tied off procedure.
- 2.3 point anchorage while ascending and descending.
- 3.Wearing the full body harness with double lanyard.
- 4.Using method of vertical / horizontal lifeline.
- 5.Training on the use of fall arrestor – rope grab and retractable.
- 6.Using the safety net for man falling and material handling.
- 7.Inspection of all fall protection equipments.
- 8.Learning of technical data's about fall protectors.

REQUIREMENTS:

- 1.Fall protection harness with double lanyard.
- 2.Rope grab.
- 3.Vertical / horizontal lifeline.
- 4.Fall arrestor – retractable.
- 5.Safety net and Debris net.
- 6.Mobile ladders.
- 7.All other training and safety required equipments.

OUTCOMES:

The students will be able to

- 1.To Illustrate tie off procedure and anchorage ascending and descending methods
- 2.To Interpret the full body harness and method of vertical / horizontal lifeline
- 3.To Priorities use of fall arrestor and safety net
- 4.To Justify technical data's on Fall arrestors and Fall protection equipments

DIPLOMA in (F&IS) III -Semester

Core: 50334		COMPUTER APPLICATIONS PRACTICAL	P	Credits: 4	Hours: 10
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OBJECTIVE

- 1.To learn about basics of MS-WORD, MS EXCEL, MS-POWERPOINT
- 2.To Implement daily activities using Computer applications

EXPERIMENTS

- 1.Type the text, check spelling and grammar bullets and numbering list items, align the text to left, right justify and centre in MS –WORD.
- 2.Prepare a job application letter enclosing your bio data in MS –WORD.
- 3.Prepare a power point presentation with atleast two slides for department inaugural function in MS POWERPOINT.
- 4.Insert an excel chart into a power point slide.
- 5.Simple commands perform sorting on name, place and pin code of students database and address printing using label format in MS ACCESS.
- 6.Worksheet using formulas in MS –EXCEL.
- 7.An Excel worksheet contains monthly sales of five companies.

COURSE OUTCOME

- 1.To describe classifications and application of computer with operating languages
- 2.To Explain about Editing documents in MS-WORD,MS-POWERPOINT,MS-EXCEL
- 3.To Formulate Excel sheet with Commands , Functions
- 4.To Create Power point and edit.

DIP (F&IS) IV -Semester

Core: 50341	Hazard Identification , Risk Assessment and Risk Control	T	Credits: 5	Hours:5
Pre-requisite	Basic Knowledge of Hazard Identification , Risk Assessment and Risk Control		Syllabus Revised	2023-2024
Course Objectives	1.To Describe fundamentals of Hazard and risk with Human error analysis 2.To Express Risk analysis with Root cause analysis methods and Cost benefit analysis 3.To Evaluate HAZOP studies with its methodologies 4.To Prioritise Hazard Identification & Risk Assessment with Qualitative and Quantitative site assessment 5.To Develop credibility of risk assessment techniques through Past accident analysis			

UNIT I FUNDAMENTALS OF HAZARD, RISK

Introduction- hazard & Risk-Risk register-Checklist-hazard characterization-horseplay-hazardous event- unsafe act-unsafe condition preliminary hazard analysis-ALARP- Concept of ALARP and its application in Risk Assessment - Safety Warning System-Human error analysis.

UNIT II RISK ANALYSIS METHODS

Risk analysis-What Is Risk Identification-*What Is Risk Analysis-benefits of risk analysis-risk analysis process*_Root Cause Analysis.Job safety analysis-Risk-Benefit and Cost-Benefit Analysis.

UNIT III SAFETY MANAGEMENT TOOLS

Hazard and Operability Studies (HAZOP)-HAZOP METHODOLOGY-Hazard analysis (HAZAN)-Fault Tree Analysis (FTA)-Event Tree Analysis (ETA)-Failure Mode &Effect Analysis (FMEA)- FMEA Methodology-Types Of FMEA-When To Use FMEA-FMEA Procedure-Steps-Risk Priority Number-Control Measure OF FMEA.

UNIT IV HAZARD IDENTIFICATION & RISK ASSESSMENT

HIRA- Objectives of HIRA study-Principles of risk assessment Steps involved in Hazard identification and risk assessment- Identification of the Hazard- Risk Analysis- Evaluation of Hazard and Risk –Risk Matrix-Risk Control Method-Preventive Measure- Control Measure-Reporting-Implementation &Monitoring-Reviewing-Types of Risk Assessment-Quantitative and Qualitative Risk Assessment-Specific Site Assessment.

UNIT V CREDIBILITY OF RISK ASSESSMENT TECHNIQUES

Past accident analysis as information sources for Hazard analysis and consequences analysis of chemical accident, Mexico disaster, Flixborough,Bhopal, Seveso, Pasadena,Feyzin disaster (1966), Port Hudson disaster-convey report.

References

1. ENVH 577 Readings (On Canvas site)
2. Harr, J., A Civil Action. Vintage Press, 1996 (on reserve at HS Library)
- 3.Devra Davis, **When Smoke Ran Like Water: Tales of Environmental Deception and the Battle Against Pollution.**
- 4.Phil Brown (editor), **Health and the Environment (HTE)**

Related online content (MOOC, Swayam,NPTEL, Website etc.)

www.atsdr.cdc.gov/HAC/HAGM/

www.epa.gov/superfund/programs/risk/ragsa/index.htm

Course outcomes		Knowledge level
CO-1	To Recall Fundamentals of Hazard and Risk with concept of ALARP	K1
CO-2	To Illustrate Risk analysis methods with Risk Identification	K2
CO-3	To Interpret Safety Management tools with HAZOP	K4
CO-4	To Justify HIRA with Risk Matrix and Risk Control Methods	K5
CO-5	To Elaborate credibility of Risk Assessment Techniques	K6

DIP (F&IS) IV -Semester					
Core: 50342		EHS Law	T	Credits:5	Hours:5
Pre-requisite	Basic Knowledge of Legal aspects of Health & Safety		Syllabus Revised	2023-2024	
Course Objectives	<ol style="list-style-type: none"> 1. To provide exposure to the students about safety and health provisions related to hazardous processes as laid out in Factories act 1948 2. To Interpret General powers of the central government, prevention, control and abatement of environmental pollution. 3. To familiarize students with powers of inspectorate of factories. 4. To help students to learn about Environment act 1986 and rules framed under the act. 5. To provide wide exposure to the students about various legislations applicable to an industrial 				
<p>UNIT I FACTORIES ACT – 1948 Statutory authorities – inspecting staff, health, safety, provisions relating to hazardous processes, welfare, working hours, employment of young persons – special provisions – penalties and procedures – Tamil Nadu Factories Rules 1950 under Safety and health chapters of Factories Act 1948. Forms, Registers and notices – Tamil Nadu Safety Officer Rules 2005 – with updated Amendments.</p>					
<p>UNIT II ENVIRONMENT ACT – 1986 General powers of the central government, prevention, control and abatement of environmental pollution – Biomedical waste (Management and handling Rules, 1989 – The noise pollution (Regulation and control) Rules, 2000 – The Batteries (Management and Handling Rules) 2001 – No Objection certificate from statutory authorities like pollution control board. Air Act 1981 and Water Act 1974: Central and state boards for the prevention and control of air pollution – powers and functions of boards – prevention and control of air pollution and water pollution – fund – accounts and audit, penalties and procedures.</p>					
<p>UNIT III MANUFACTURE, STORAGE AND IMPORT OF HAZARDOUS CHEMICAL RULES 1989 AND MAJOR ACCIDENT HAZARD CONTROL RULES AND AMENDMENT Definitions – duties of authorities – responsibilities of occupier – notification of major accidents – information to be furnished – preparation of offsite and onsite plans – list of hazardous and toxic chemicals – safety reports – safety data sheets. Major Accident Hazard Control Rules. Hazardous Wastes (management, handling and Transboundary Movement) Rules 2016.</p>					
<p>UNIT IV OTHER ACTS AND RULES Indian Boiler (Amendments) Act 2007, static and mobile pressure vessel rules (SMPV), motor vehicle rules, The Mines and Minerals (Development & Regulation) Amendment Act, 2015, workman compensation act, rules – electricity act and rules – hazardous wastes (management, handling and trans boundary) rules, 2008 - the building and other construction workers act 1996., Petroleum rules, Gas cylinder rules 2016, Explosives Act 1884 – Pesticides Act – E-waste (management) rules 2016.</p>					
<p>UNIT V INTERNATIONAL ACTS AND STANDARD Occupational Safety and Health act of USA (The Williams - Steiger Act of 1970) – Health and safety work act (HASAWA 1974, UK) – ISO 14001 – ISO 45001, European Safety and Health Legislations, American Petroleum Institute (API) Standards, Oil Industry Safety Directorate (OISD) Standards, National Fire Protection Association (NFPA) Standards, Atomic Energy Regulatory Board (AERB), American National Standards Institute (ANSI)</p>					
<p>References</p> <ol style="list-style-type: none"> 1. The Factories Act 1948, Madras Book Agency, Chennai, 2000 2. The Environment Act (Protection) 1986, Commercial Law Publishers (India) Pvt.Ltd., New Delhi. 3. Water (Prevention and control of pollution) act 1974, Commercial Law publishers (India) Pvt.Ltd., New Delhi. 4. Air (Prevention and control of pollution) act 1981, Commercial Law Publishers (India) Pvt.Ltd., New Delhi. 5. The Indian boilers act 1923, Commercial Law Publishers (India) Pvt.Ltd., Allahabad. 					
<p>Related online content (MOOC, Swayam, NPTEL, Website etc.)</p>					
<p>https://onlinecourses.nptel.ac.in/noc23_1w03/preview</p>					
<p>https://archive.nptel.ac.in/noc/courses/noc21/SEM1/noc21-ce16/</p>					

Course outcomes		Knowledge level
CO-1	To list out important legislations related to health, Safety and Environment.	K1
CO-2	To list out requirements mentioned in factories act for the prevention of accidents.	K1
CO-3	To Interpret the health and welfare provisions given in factories act.	K4
CO-4	To Justify the statutory requirements for an Industry on registration, license and itsrenewal	K5
CO-5	To Develop onsite and offsite emergency plan	K6

DIPLOMA in (F&IS) IV -Semester

Core: 50343		RISK ASSESSMENT PRACTICAL	P	Credits: 4	Hours: 6
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OBJECTIVE:

- 1.To Identify Hazards and provide Evaluation methods with qualitative and quantitative analysis
- 2.To Assess Risk analysis and SIL with safety Instrumentation systems.

EXPERIMENT

- Step 1: identify the hazards
- Step 2: decide who may be harmed and how
- Step 3: evaluate the risks and decide on control measures
- Step 4: record your findings
- Step 5: review the risk assessment

COURSE OUTCOMES:

The students will be able to:

- 1.To Identify hazards and Illustrate Risk and Risk Ranking
- 2.To evaluate Hazard & Relate Risk Analysis for an incident
- 3.To Formulate Qualitative and Quantitative Hazard Analysis for incidents
- 4.To Determine SIL and explain HAZOP and FMEA procedures

REFERENCES

- 1."Plant Hazard analysis and safety Instrumentation systems", Swapna Basu , Academic Press-Elsevier,ISBN:9780128037638

DIPLOMA in (F&IS) IV -Semester

Core: 50344		<u>INDUSTRIAL SAFETY PRACTICAL</u>	P	Credits: 4	Hours: 6
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EXPERIMENTS:

TRAINING IN USAGE AND SKILL DEVELOPMENT

1. Personal protective equipment:

Respiratory and non-respiratory-demonstration-self contained breathing apparatus. Safety helmet, belt, hand gloves, goggles, safety shoe, gum boots, ankle shoes, face shield, nose mask, ear plug, ear muff, anti static and conducting plastics/rubber materials, apron and leg guard.

2. Fire extinguishers and its operations

Water Co₂

Foam

Carbon dioxide (Co₂)

Dry chemical powder

3. Static charge testing on plastic, rubber, ferrous and non-ferrous materials.

4. Illumination testing - by LUX meter and photo meter.

5. Electrical safety

- Insulation resistance for motors and cables
- Estimation of earth resistance
- Earth continuity test
- Sensitivity test for ELCB

6. Software Usage

- Accident Analysis
- Safety Audit Packages
- Consequence Analysis (CISCON)
- Fire, Explosion and Toxicity Index (FETI)
- Reliability Analysis for Mechanical system and Electrical System
- Failure Mode Analysis

7. First-Aid

- Road safety signals and symbols

Equipments Required

- Noise level meter : 1 No
- Friction tester : 1 No
- Impact tester : 1 No
- Exhaust gas analyzer: 1 No
- High volume sampler : 1 No
- PPE Set : 1 No
- Fire extinguisher set : 1 No
- Static charge tester : 1 No
- First aid kit : 1 No

Software: CISCON, FETI and Failure Mode analysis

DIPLOMA in (F&IS) IV -Semester					
Core: 50345		<u>INDUSTRIAL INTERNSHIP</u>	I	Credits: 4	Hours: 8

The commercial training aims to enable students to acquire practical knowledge of operational safety and safety equipment in a renowned industry or institution. The training includes practical training on industrial security devices, case studies on security measures/systems used in the industry/institution, and new safety protection techniques. The training takes place in groups of people.

Students are required to complete industrial training in a reputed industry or Institution during a vacation of approximately 10 to 15 days. For students seeking commercial training, the industry chosen for training must be at least a stock corporation. During this time, students submit and submit a progress report to the institute for internal review at least once a week.

The final examination at the end of the commercial training semester is carried out by an external examiner and an internal examiner named by the Institute. The external examiner will be from the Alagappa University-approved panel of the concerned institute. The assessment of industrial training is carried out based on a seminar, an interview, a report, and a certificate. Industrial Training or Institutional Project Work obtained by a student of an industry or institute.

The internal distribution of grades for students with commercial training includes 25 points from the industrial company and 75 points from the members of a commission made up of professors from the respective department at the parent university. The teachers hired to work on the institutional project have a workload of 2 hours per group (at least 6 students) per week.

DIP (F&IS) V -Semester					
Core: 50351		Safety Inspection and Audit	T	Credits:5	Hours:5
Pre-requisite	Basic Knowledge of Safety Inspection and Audit		Syllabus Revised	2023-2024	
Course Objectives	1.To achieve understanding of safety inspection and audit 2.To enable students to conduct safety audit and write audit report effectively in auditing situation 3.The course could provide basic knowledge of OHSMS and EMS 4.To educate about the various steps to be taken for certification of ISO 14001(EMS) 5.To impart knowledge on environmental impact assessment, life cycle assessment of product and principles of eco labeling				
<p>Unit I-SAFETY INSPECTION</p> <p>Importance of Workplace Inspection Planning of Workplace Inspection Purpose of Workplace Inspection Hazards in Workplace Information's Required in Workplace Inspection Report Inspection Team Duration of Inspection - Frequency of Inspection - Follow up & Monitoring - Summary</p> <p>Unit II-SAFETY AUDIT</p> <p>Introduction Types of Audits Audit Objectives Methodology to Conduct Safety Audit- Pre Audit Activities - Background Information to be Gathered Data to be Gathered - On Site Activities - Understanding Management Systems Assessing Strengths & Weaknesses - Collecting Audit Evidence - Interviewing - Observation Evaluating Audit Evidence Reporting Audit Findings - Post Audit Activities.</p> <p>Unit-III-OH & S MANAGEMENT SYSTEM STANDARD</p> <p>Introduction to ISO 45001 – Development of various OHSMS standards – aim of OH & S management system–success factors– plan do check act cycle- contents and scope of ISO 45001- terms and definitions –leadership and worker participation –leadership and commitment - OH & S policy- organizational roles and responsibilities and authorities – consultation and participation of workers</p> <p>UNIT- IV ISO 14001</p> <p>EMS, ISO 14001, specifications, objectives, Environmental Policy, Guidelines and Principles (ISO 14004), clauses 4.1 to 4.5. Documentation requirements, 3 levels of documentation for a ISO 14000 based EMS, steps in ISO 14001</p> <p>UNIT V- ENVIRONMENT IMPACT ASSESSMENT</p> <p>ISO 14040(LCA), General principles of LCA, Stages of LCA, Report and Review. ISO 14020 (Eco labeling) – History, 14021, 14024, Type I labels, Type II labels, ISO 14024, principles, rules for eco labeling before company attempts for it. Advantages. EIA in EMS, Types of EIA, EIA methodology EIS, Scope, Benefits.</p>					
<p>References</p> <ol style="list-style-type: none"> 1. ISO 45001: 2018 –Occupational Health and safety management systems Requirements with guidance for use 2. ISO14001:2004, Environmental Management Systems Requirements with Guidance for Use” ,ISO, 2004. 3. “Guidelines on Occupational Health and Safety Management Systems (OSH-MS)” International Labour Organization, 2001 4. Heinrich H.W. “Industrial Accident Prevention” McGraw-Hill Company, New York, 1980 5. John Ridley, “Safety at Work”, Butterworth and Co., London, 1983 					
<p>Related online content (MOOC, Swayam,NPTEL, Website etc.)</p> <p>https://archive.nptel.ac.in/courses/110/105/110105160/</p> <p>https://onlinecourses.nptel.ac.in/noc23_mg48/preview</p>					
Course outcomes					Knowledge level
CO-1	To recall basic safety audit and prepare a report for safety audit				K1
CO-2	To Illustrate safety inspection and prepare a report for safety inspection				K2
CO-3	To interpret various standards for maintaining OHSMS				K4
CO-4	To Justify ISO 14001standards on Safety audit and inspection				K5

CO-5	To Discuss EIA and ecosystem development	K6
DIP (F&IS) V -Semester		
Core: 50352	Safety in Oil & Gas Industries	T Credits:5 Hours:5
Pre-requisite	Basic Knowledge of Safety in Oil & Gas Industries	Syllabus Revised 2023-2024
Course Objectives	1.To give basic information about oil and gas work process 2. To Analyze Root cause and reliability analysis in Oil and Gas industries 3.To Regulate Safety norms and procedures in Offshore 4.To Interpret Accident factors in Oil and gas Industry with Common hazards and Precaution measures 5.To Evaluate Accident Data Analysis based on previous accident records	
UNIT-1 INTRODUCTION TO OIL AND GAS SAFETY		
introduction –upstream –down stream- mid stream- safety management principle –product hazard classification – product organization task-common cause of work injuries –differentiate of onshore and offshore –accident caution theory- human error occurrence reasons and consequences-bath tub hazard curve.		
UNIT -2 SAFETY ANALYSIS METHODS AND RELIABILITY ANALYSIS IN OIL AND GAS INDUSTRY.		
Introduction –root cause analysis-HAZOP(hazards and operability analysis)-interface safety analysis-job safety analysis-preliminary hazards analysis-failure mode of effective analysis-fault tree analysis-markov methods-daily observation report –safety checklist- safety training program- tool box talk – safety induction training- on job training- refreshment training.		
UNIT-3 OFFSHORE SAFETY		
Introduction –Who regulates the offshore safety-consequences of not following safety –offshore industrial risk picture-offshore worker situation awareness concept-studies and result –offshore industry accident reporting procedure – important of regular inspection of machinery –offshore industry accident case studies (Mumbai north platform, piper alpha accident-glomar java sea drillship accident- baker drilling barge accident-seacrest drillship accident).		
UNIT-4 OIL AND GAS INDUSTRY ACCIDENT FACTORS		
Introduction- human factors that effects in general-organization factor-group factor-individual factor-oil field fatalities analysis-common hazards in oil and gas industry-explosion and fire hazards-recommendation reduce fatal oil and gas industry accident- work permit system		
UNIT -5 MAIN CAUSES OF ACCIDENT IN OIL AND GAS INDUSTRY AND ACCIDENT DATA ANALYSIS		
Introduction –confined space –hazards- requirements of ventilation and gas test –precaution steps .lifting –hazards – control measure of lifting activities-hazardous materials –dehydration –poor lighting-work at height –storage and handling of flammable liquids-offshore oil and gas industry accident data base and accident data collection sources.		
References		
1. “Accident Prevention Manual for Industrial Operations” NSC, Chicago, 1982.		
2. “Quantitative Risk Assessment in Chemical Process Industries” American Institute of Chemical Industries, Centre for Chemical Process safety.		
3.B.S. Dhillonm, safety and reliability in the oil and gas industry apractical approach, CRC press, Taylor and francis group 2016.		
4. Alireza bahadori, personnel protection and safety equipment for oil and gas industries, gulf professional publishing of Elsevier group 2015		
5. Abdul khalique, Basic offshore safety, routledge 2016		
Related online content (MOOC, Swayam,NPTEL, Website etc.)		
https://archive.nptel.ac.in/courses/114/106/114106017/		
https://onlinecourses.nptel.ac.in/noc19_oe02/preview		
Course outcomes		Knowledge level
CO-1	To Recall the functions of upstream, midstream and downstream segments	K1
CO-2	To Explain Work related to oil and gas industry covering flammability limits, explosive hazards, and other hazardsrelated to health, safety and environment	K2
CO-3	To describe offshore oil and gas industry who are responsible for ensuring safety, health and security for workers as part of their daily routines.	K1
CO-4	To Elaborate about the recommendation to reduce fatal oil and gas industry accidents	K6
CO-5	To Discuss about work permit system like hot work, confined spaced job work entry etc.	K6

DIPLOMA in (F&IS) V -Semester					
Core: 50353		CONFINED SPACE ENTRY, WORKING, EXIT & RESCUE OPERATION PRACTICAL	P	Credits: 4	Hours: 6

EXPERIMENTS

- 1.Practise on gas detecting / testing and other inspection of toxic gases.
- 2.Practise on entry into confined space and rescue operation.
- 3.Practise on work permit system for confined space entry.
- 4.Purging/cleaning/removing of toxic gases or any other flammable gases.
- 5.Direct supervision of confined space attendant / hole watcher.

REQUIREMENTS

- 1.Portable Gas tester.
- 2.Proper safety sign boards.
- 3.Suitable fire extinguisher.
- 4.First aid box.
- 5.Emergency escape breathing apparatus.
- 6.Required PPE.

OUTCOMES

The students will be able to

- 1.To Operate gas detecting and testing for inspection of toxic gases
- 2.To Assess Entry and rescue operation in confined space
- 3.To Evaluate work permit system for confined space entry
- 4.To Priorities Cleaning and removing of toxic and flammable gases
- 5.To describe about direct supervision of confined space to Hole watcher and Confined space attendant.

REFERENCES

- 1.Health Safety and Environment-Training Manual-Oil & Gas Sector-SPIC
- 2.Tata Mc Graw Hill-Industrial Safety Management-I.M Deshmukh-2016

DIPLOMA in (F&IS) V -Semester

Core: 50354		PPE PRACTICAL	P	Credits: 4	Hours: 6
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COURSE OBJECTIVE

- 1.To equip and use PPE
- 2.To Practice the usage of PPE in workplace

EXPERIMENT

1. Personal protective equipment:
2. Breathing PPE: Respiratory and non-respiratory-demonstration-self contained breathing apparatus
3. Head Protection PPE: Safety helmet, belt, hand gloves, goggles, safety shoe, gum boots, ankle shoes, face shield, nose mask, ear plug, ear muff, anti static and
4. Leg Protection PPE: conducting plastics/rubber materials, apron and leg guard.

EQUIPMENTS REQUIRED

1. Noise level meter : 1 No
2. Friction tester : 1 No
3. Impact tester : 1 No
4. Exhaust gas analyzer: 1 No
5. High volume sampler : 1 No
6. PPE Set : 1 No
7. Fire extinguisher set : 1 No
8. Static charge tester : 1 No
9. First aid kit : 1 No

COURSE OUTCOMES

- 1.To Recall the usage of PPE
- 2.To Justify the usage of PPE in Workplace
- 3.To Classify PPE in Workplace
- 4.To Practice the usage of PPE in Workplace

DIPLOMA in (F&IS) V -Semester					
Core: 50355	Project	PROJECT PHASE - I	PR	Credits: 5	Hours: 8

Develop the ability to solve a specific problem from identification and literature review to effective resolution. Train students to prepare project reports and conduct oral reviews and exams. Students in groups of 3-4 people work on a topic validated by the head of the department under the supervision of a teacher complete the work and prepare a complete project report to the satisfaction of the supervisor.

Project progress will be assessed through at least three reviews. The examination committee can be appointed by the head of the department.

A project report is required at the end of the semester. The assessment of the project work is carried out based on a joint oral presentation and a project report by external and internal assessors, including the head of the department.

DIPLOMA (F & IS) VI-Semester				
CORE:50361		Process safety management	T	Credits:5 Hours:5
Pre-requisite	Basic Knowledge of Process safety management		Syllabus Revised	2023-2024
Course Objectives	1. To familiarize the basic information about process safety. 2. To provide technical knowledge in process hazard analysis. 3. To educate on process safety elements. 4. To analyze the incident investigation methods. 5. To learn about emergency planning and response.			
<p>UnitI – Process Safety Information Hazards of Regulated Substance – Block Flow Diagram – Process Chemistry – Maximum Intended Inventory – Upper & Lower Limits – Consequences of Deviation – Materials of Construction – Piping & Instrumentation Diagrams – Electrical Classification – Relief System Design – Ventilation System Design – Design Codes & Standards – Materials & Energy Balances – Safety Systems</p> <p>UnitII – Process Hazard Analysis, Operating Procedures & Training Introduction – Deciding the Methods of PHA – Limitations of PHA's – Prioritizing PHA's – Methods for Conducting the PHA: What If, Checklist, HAZOP, FMEA, FTA – PHA Team – PHA Findings – Review & Revalidation – Description of Operating Procedure – Elements of Operating Procedure – Availability of Operating Procedure – Initial Training – Intermittent Training – On the Job Training – Refresher Training – Training Documentation</p> <p>Unit III – Mechanical Integrity, Management of Change, Prestart up Review & Compliance Audits Mechanical Integrity – Training – Equipment Deficiencies & Quality Assurance – Management of Change – Prestart Up Review – Compliance Audits</p> <p>UnitIV – Incident Investigation, Employee Participation & Trade Secrets Incident Investigation – Investigation Methodologies – Investigation Questionnaire – Employee Participation – Trade Secrets</p> <p>UnitV – Hot Work Permit, Contractors & Emergency Response Hot Work Permit – Contractor Selection – Principle Employer Responsibilities – Contractor Employer Responsibilities – Emergency Planning & Response</p>				
References				
1. "Process Safety Management Manual" US Department of Labor, OSHA 3132, Reprinted on 2000				
2. "DOE Handbook – Process Safety Management for Highly Hazardous Chemicals", US Department of Energy				
3. "Risk Management Plan (RMP) & Process Safety Management (PSM) Manual", Newington Energy, General Electric Contractual Services, Triton Environmental Inc				
4. "Chemical Process Safety: Learning from Mistakes", Roy E. Sanders, Butterworth-Heinemann, Elsevier.				
Related online content (MOOC, Swayam, NPTEL, Website etc.)				
https://archive.nptel.ac.in/courses/103/107/103107156				
https://archive.nptel.ac.in/noc/courses/noc19/SEM2/noc19-ch19				
Course outcomes				Knowledge level
CO-1	To find the fundamental concepts of process safety management.			K1
CO-2	To Identify the process hazard analysis methods.			K3
CO-3	To Generate the importance of process safety elements			K4
CO-4	To explain the methods of incident investigation.			K5
CO-5	To Discuss about handling of emergencies.			K6

DIPLOMA (F& IS) VI -Semester					
CORE: 50362		Behaviour based safety	T	Credits:5	Hours:5
Pre-requisite	Basic Knowledge of Behaviour based safety and Industrial ergonomics.		Syllabus Revised	2023-2024	
Course Objectives	1. To learn the basic information about human behaviour 2. To provide knowledge of group behaviour. 3. To educate the concepts of behaviour based safety. 4. To familiarize the information about workplace ergonomics. 5. To learn about ergonomical system design of workers..				
UNIT-I-INDIVIDUAL BEHAVIOUR					
Personality types - Factors influencing personality - Theories - Learning - Types of learners-The learning process-Learning theories-Organizational behavior modification-Misbehavior-Types-Management Intervention Emotions Emotional Labor-Emotional Intelligence Theories- Attitudes Characteristics Components Formation- Measurement Values. Perceptions Importance Factors influencing perception Interpersonal perception Impression Management- Motivation - Importance-Types -Effects on work behavior.					
UNIT-II-GROUP BEHAVIOUR					
Organization structure dynamics Emergence of informal leaders and working norms - Group decision making- Formation Groups in organizations Influence Group techniques-Team building - Interpersonal relations-Communication - Control.					
UNIT-III-BEHAVIOUR BASED OBSERVATION AND FEEDBACK					
Introduction to BBS(Behavior based safety)-Why behavior based safety-ABC model of behavior change-ABC behavior model-ABC behavior model consequences-ABC behavior model feedback -Safety coaching through observation and feedback-Integrating behavioral safety principles in to other management systems-Critical impact of social comparison feedback-Seven lessons from behavior based safety for increasing PPE use-Addressing ergonomic hazards through behavior based observation and feedback-Safety culture.					
UNIT-IV-ERGONOMICS					
Definition-applications of ergonomic principles in the shop floor-work benches-seating arrangements - layout of electrical panels- switch gears - principles of motion economy-location of controls-display locations-machine foundations- work platforms, fatigue, physical and mental strain - incidents of accident-physiology of workers.					
UNIT V WORK DESIGN FOR STANDING AND SEATED WORKS					
Design For Everyone, Anthropometry And Personal Space, Effectiveness And Cost Effectiveness Fundamental Aspects Of Standing And Sitting, An Ergonomics Approach To Work Station Design, Design For Standing Workers, Design For Seated Workers, Work Surface Design -Guidelines For Design Of Static Work, Effectiveness And Cost.					
References					
1. Behaviour-Based Safety in Organizations: Life Before the Accident Paperback – 30 April 2017 by <u>H.L. Kaila</u> (Author)					
Related online content (MOOC, Swayam,NPTEL, Website etc.)					
https://archive.nptel.ac.in/courses/110/105/110105160					
https://alison.com/course/behaviour-based-safety-revised					
Course outcomes					Knowledge level
CO-1	To name the fundamental concepts of human behaviour.				K1
CO-2	To Identify the information about workplace groups.				K3
CO-3	To examine the behaviour based safety and model.				K4
CO-4	To explain the ergonomic principles in workplace.				K5
CO-5	To construct the ergonomical system design of workplace and work				K6

DIPLOMA in (F&IS) VI -Semester

Core: 50363	EHS OBSERVATION PRACTICAL	P	Credits: 4	Hours: 10
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EXPERIMENTS:

TRAINING IN USAGE AND SKILL DEVELOPMENT

8. Personal protective equipment:

Respiratory and non-respiratory-demonstration-self contained breathing apparatus. Safety helmet, belt, hand gloves, goggles, safety shoe, gum boots, ankle shoes, face shield, nose mask, ear plug, ear muff, anti static and conducting plastics/rubber materials, apron and leg guard.

9. Fire extinguishers and its operations

Water Co₂

Foam

Carbon dioxide (Co₂)

Dry chemical powder

10. Static charge testing on plastic, rubber, ferrous and non-ferrous materials.

11. Illumination testing - by LUX meter and photo meter.

12. Electrical safety

- Insulation resistance for motors and cables
- Estimation of earth resistance
- Earth continuity test
- Sensitivity test for ELCB

13. Software Usage

- Accident Analysis
- Safety Audit Packages
- Consequence Analysis (CISCON)
- Fire, Explosion and Toxicity Index (FETI)
- Reliability Analysis for Mechanical system and Electrical System
- Failure Mode Analysis

14. First-Aid

- Road safety signals and symbols

Equipments Required

- Noise level meter : 1 No
- Friction tester : 1 No
- Impact tester : 1 No
- Exhaust gas analyzer: 1 No
- High volume sampler : 1 No
- PPE Set : 1 No
- Fire extinguisher set : 1 No
- Static charge tester : 1 No
- First aid kit : 1 No

Software: CISCON, FETI and Failure Mode analysis

DIPLOMA in (F&IS) VI -Semester

Core: 50364	Project	PROJECT PHASE - II	PR	Credits: 5	Hours: 10
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Develop the ability to solve a specific problem from identification and literature review to effective resolution. Train students to prepare project reports and conduct oral reviews and exams. Students in groups of 3-4 people work on a topic validated by the head of the department under the supervision of a teacher complete the work and prepare a complete project report to the satisfaction of the supervisor.

Project progress will be assessed through at least three reviews. The examination committee can be appointed by the head of the department.

A project report is required at the end of the semester. The assessment of the project work is carried out based on a joint oral presentation and a project report by external and internal assessors, including the head of the department.

Diploma Programme

Passing minimum

- A candidate shall be declared to have passed in each course if he/she secures not less than 40% marks in the End Semester Examinations and 40% marks in the Internal Assessment and not less than 40% in the aggregate, taking Continuous assessment and End Semester Examinations marks together.
- The passing minimum for CIA shall be 40% out of 25 marks (i.e.10 marks) in Theory/ Practical Examinations.
- The passing minimum for University Examinations shall be 40% out of 75 marks (i.e. 30 marks) for Theory /Practical papers.
- The candidates not obtain 40% in the Internal Assessment are permitted to improve their Internal Assessment marks in the subsequent semesters (2 chances will be given) by writing the CIA tests or by submitting assignments.
- Candidates, who have secured the pass marks in the End-Semester Examination and in the CIA but failed to secure the aggregate minimum pass mark (E.S.E + C I.A), are permitted to improve their Internal Assessment mark in the following semester and/or in University examinations.
- A candidate shall be declared to have passed in the Dissertation/Project report/Internship report if he/she gets not less than 40% marks in the Internal Assessment and End Semester Examinations and not less than 40% in the aggregate, taking Continuous assessment and End Semester Examinations marks together.
- A candidate who gets less than 40% in the Dissertation / Internship/ Project Report must resubmit the thesis. Such candidates need to take again the Viva-Voce on the resubmitted report/thesis.