

BHARATHIARUNIVERSITY: COIMBATORE-641 046
B.Sc. OCCUPATIONAL HEALTH & SAFETY MANAGEMENT

(For the CCII students admitted from the academic year 2016-17 onwards)

SCHEME OF EXAMINATION - CBCS PATTERN

Part	Course Title	Hrs/ Ins. week	Examinations				Credits
			Dur. Hrs.	CIA	Uni. Exam	Total Marks	
Semester-I							
I	Language-I	6	3	25	75	100	4
II	English-I	6	3	25	75	100	4
III	Core-1- Fire Science**	4	3	25	75	100	4
III	Core Practical 1-Fire Science	2	2	20	30	50	2
III	Core-2 - Construction Safety**	4	3	25	75	100	4
III	Core Practical 2- Construction Safety	2	2	20	30	50	2
III	Allied 1 - Industrial Safety Management - 1	4	3	25	75	100	4
IV	Environmental studies #	2	2	-	50	50	2
Semester – II							
I	Language-II	6	3	25	75	100	4
II	English-II	6	3	25	75	100	4
III	Core -3– Fire Technology**	4	3	25	75	100	4
III	Core Practical 3- Fire Technology	2	2	20	30	50	2
III	Core -4– Security Management of Industries	4	3	25	75	100	4
III	Core Practical 4 - Security Management of Industries	2	2	20	30	50	2
III	Allied 2 – Industrial Safety Management - 2	4	3	25	75	100	4
IV	Value Education – Human Rights #	2	2	-	50	50	2
Semester - III							
I	Core – 5-Occupational Safety - 1	6	3	20	55	75	3
II	Core – 6-Legal Aspects of Safety	6	3	20	55	75	3
III	Elective-1 **	6	3	20	55	75	3
III	Practical for Elective-1	2	2	20	30	50	2
IV	Allied 3-Personality Development	6	3	25	75	100	4
IV	Skill Based Subject 1-Maintenance of Fire Protection Systems**	2	2	20	55	75	3
III	Tamil @ / Advanced Tamil # (or)Non-Major Elective-I Yoga for Human Excellence # / Women's Rights # # Constitution of India ##	2	3	-	50	50	2

Semester - IV							
I	Core- 7-Occupational Safety - 2	6	3	25	75	100	4
II	Core-8-First Aid & Emergency Procedures**	5	3	25	75	100	4
III	Core Practical-5-First Aid & Emergency Procedures	3	2	20	30	50	2
III	Elective-2 **	4	3	20	55	75	3
III	Practical for Elective-2	2	2	20	30	50	2
IV	Allied 4 - Communicative English	5	3	25	75	100	4
IV	Skill Based Subject-2 – Practical: Maintenance of Fire Protection Systems	3	2	30	45	75	3
IV	Tamil @ / Advanced Tamil # (or) Non-Major Elective- II –General Awareness #	2	3	-	50	50	2
Semester - V							
I	Core-9 – Occupational Health & Hygiene Management	6	3	25	75	100	4
II	Core-10-Occupational Health & Safety Standards	6	3	25	75	100	4
III	Elective-3**	5	2	20	55	75	3
III	Practical for Elective-3	2	2	20	30	50	2
III	Elective-4**	5	2	20	55	75	3
III	Practical for Elective-4	2	2	20	30	50	2
IV	Skill Based Subject-3- Scaffolding	2	2	20	55	75	3
IV	Skill Based Subject-4-Scaffolding - Practical	2	2	30	45	75	3
Semester - VI							
III	Project Work & Viva Voce (On Job Training) *					500	20
TOTAL						3500	140

LIST OF ELECTIVES

Colleges can choose any one of the paper as electives

SUBJECT	TITLE
Elective-1	OHSAS 18001 HSE Management System
	Safety Management of Plants during Commissioning & Maintenance
Elective-2	Disaster Management
	Industrial Psychology
Elective-3	Safety in Power Plants
	Controlling of Environmental Pollution
Elective-4	Safety Training
	Principles of Risk Management

\$ Includes 25% / 40% continuous internal assessment marks for theory and practical papers respectively.

@ No University Examinations. Only Continuous Internal Assessment (CIA)

No Continuous Internal Assessment (CIA). Only University Examinations

** For Subjects with practical

* Project work/Internship: For Report 80% Marks & Viva-Voce 20% Marks

PROJECT WORK (ON JOB TRAINING) – MARKS - 500

On successful completion of five semesters- the students proceed to their final semester where they will undertake six months On Job Training related to on site Safety Management- Risk Assessment- Inspections- Supervision- Internal Audit- documentation etc. They will be carrying out this project at small/medium/heavy construction sites or Industries.

During this period the students will perform various activities related to Safety management like conducting the Tool Box Talks- performing Risk Assessment & developing control strategies- implement Safe Systems of Work- develop work method statements thereby gaining professional hands-on experience in their chosen area. This enables the students to attain the level of competency required for entry into the Safety Management stream. It also empowers the students to shoulder higher responsibilities within the Safety Management System at a younger age. This Project can also result into enhancing the employability of the student thus a placement in the same site/company can also be achieved by the students if they perform better in their role.

Core-1 – Fire Science

Objective: This course will enable students to refresh and understand basic science and gradually introduce them to fire chemistry- fire physics and fundamentals of fire related science. The students will have a strong foundation in basic fire engineering and various fire control measures on completion of this course.

UNIT-I - History of fire service - Basic physics

Units - Guidelines for writing the units - Force- resultant force - Laws of force - Laws of motion - Mass and weight- work- power- energy - Law of conservation of energy - Mechanics – rest and motion - Distance and displacement - Speed and velocity - Acceleration- retardation - Acceleration due to gravity - Newton laws of motion - Machines and engines - Efficiency - Friction

UNIT –II - Basic Chemistry and physics of fire

Atomic structure - Elements- compounds - Pure substance and mixture - Physical and chemical changes - Condition for the changes - Energy changes - Effects of heat on matter - Combustion - Temperature - Specific heat capacity - Catalyst - Neutralization - Sublimation - Heat of decomposing - Chemical reaction - Exothermic reaction and endothermic reaction - Transmission of heat - Flash and fire point - Ignition temperature - Flammables and combustible chemicals - Spontaneous combustion - Triangle of combustion -Tetrahedron fire - Spread of fire

UNIT - III – Fire prevention & Control

Classification of fire - General Causes of fire - Detection of fire - Extinguishing methods - First aid fire fighting equipments - Fire bucket- Fire beater- hose reel hose - Portable extinguisher - depends on weight - depends on operating method - depends on content - depends on position of nozzle - Construction - Operation - Maintenance – refilling – Building design and fire protection

UNIT - IV - Fixed fire fighting installations using water

Hydrant or fire water system - Classification of hydrant system - Sprinkling system - Major foam pourer system - Steam drenching system - Emulsification - Special fires and fire fighting - Air craft fire - Ships fire

UNIT – V Fixed fire fighting installations not using water- Ropes & Drills

Complete CO2 flooding system - Complete DCP spraying system - Complete Halon flooding system- Investigation of fire - Point- Time and cause of ignition - Arson and detection of fires – Ropes – various types of ropes- knots & uses – Drill – Squad – Discipline – Command and Control - parade

References:

1. Fire Service First Responder - Daniel Limmer- Michael Grill
2. Hand book of fire and Explosion Protection Engineering Principles for Oil- Gas- Chemical and Related Facilities - Dennis. P. Nolan- PE
3. Fire Equipment - David L. Bever
4. Engineering Chemistry - Jain & Jain
5. Fire Technology – RS Gupta

Core-2 – Construction Safety

Objective: This course will enable the students to know about the industry related health hazards and diseases and various methods and process implementation to avoid and eliminate health hazards. Also gives a good theoretical and practical understanding on various safety measures in construction industry. The students can have a thorough knowledge about various hazards involved in the construction industry and hazard control methods- their engineering and management.

UNIT I - Safety- Health and Environment in Construction

Introduction and stages in construction – stages of project construction – Safety during receiving- unloading- shifting and storage – guidelines for storage – General safety facilities in construction sites – Interface between civil & erection works - Construction Safety - Contractors Safety

UNIT II – Construction hazards & safety measures - 1

Asbestos - Cement Manufacture - Confined Spaces - Demolition and Explosives - Electrical Safety - Excavation Safety - Eye Safety - Falls - Fall Protection – Head Protection - Hearing Conservation - Heat Stress - Heavy Equipment Safety

UNIT III – Construction hazards & safety measures - 2

Ladder Safety - Lockout/Tag out - Outdoor Safety - Painting Safety - Personal Protective Equipment
Personnel Lift Safety - Respiratory Protection - Road Construction Safety - Scaffolding Safety - Subcontractor-Safety - Tools – Safety - Trenching and Shoring - Welding Safety

UNIT IV – Mechanical handling of material & equipment

Hoisting equipment – tools & tackles – crabs & winches – conveyors – ropes – chains – sheaves – hooks – safe rigging methods – banks man – lifting plan – guidelines for safe lifting

UNIT V – Storage and Handling of Hazardous Materials

Storage & handling of compressed gases – Acetylene – Oxygen – LPG – Hydrogen - COSHH
Construction Safety documentation: HSE Policy – Project HSE Plan – Organisation chart – Emergency plan - Environmental Plan – Lifting Plan – Hazard / Risk Log – Fire Safety Plan – Permits – SOPs – ACOPs – Best Practices – Work Instructions – Injury Log – First Aid Log – Accident report – Accident Investigation report – Accident Record – Near Miss Report & Record – Illness record – Preparation of agenda points- minutes of meeting- Report of meeting pertaining to Safety Committee- Inspection Check list & report – Internal Audit Check list & report

Reference:

1. Construction Safety Hand Book – K Muraleedharan Pillai
2. ILO Convention – C-167 – Construction
3. Safety Management in the construction Industry - Guide Published by National Institute of Construction – Second edition – 2005

Allied – 1 - INDUSTRIAL SAFETY MANAGEMENT – 1

Objective: To help students to understand the fundamentals of Safety Management like the scope and nature of occupational health and safety- the moral-social-economic reasons for maintaining safety and the basic approach to prevention of accidents and illness at work place.

Unit-1 – Introduction to health & safety

Scope of business standardization – ISO 9001 – ISO 14001 – OHSAS 18001 – Integrated Management System -Need for integration of Safety- Health & Environment – Role of top management – Role of National Government & International bodies in formulating framework for regulation of safety – Fundamentals of Safety

Unit-2 - Scope & Nature of occupational health & safety

The scope and nature of occupational health and safety - moral-social-economic reasons for maintaining safety-Definitions: Health – Safety – Welfare- Near Miss – Accident – Dangerous occurrence – Environment – Environmental protection – Hazard – Risk – occupational illness – occupational accident

Unit-3 – Safety Management

Introduction to safety and safety management - Accident causation – Hazard – Trigger – Risk – Heinrich Triangle – Frank Bird Triangle - Domino Theory – General Instructions for safety – Industrial safety practices – classification of accidents – Terms and definitions- General Safety rules

Unit-4 – Introduction to Health & Safety Management System

Safety Management – Management- Organisation and Administration - Objectives of Safety Management – Approaches to prevent accident – Safety Department – Organisation structure – Responsibilities of: Management - Workers- Directors and senior managers- Safety Managers- Safety specialists- Supervisors- Contractors- Joint occupiers- Manufacturers & Suppliers – Safeguarding the public

Unit-5 - Role of National Governments & International bodies in Health & Safety

Role of ILO – ILO Conventions & Recommendations – Responsibilities of Government- Social organizations & Public Authorities – Role of enforcement agencies – Consequence of non compliance – Barriers to good standards of safety

References:

1. Industrial Safety Management – LM Deshmukh
2. ILO Convention – 155 & Recommendation – 164
3. Indian Factories Act 1948
4. Management of International Health & Safety – Roger Passey

Core -3– Fire Technology

COURSE OBJECTIVE This course will enable the students to various fire prevention methods- fire protection method and the modern equipments used for fire prevention and fire protection. That includes working principle- design and construction- operation- maintenance- transportation and safe custody etc. with appropriate practical in related equipments and systems.

UNIT -I - Hose

Types of hose - Characteristic - Frictional loss - Material used - Cause and prevention of mildew - Causes and prevention of shock - Causes and prevention of rubber acid - Care and maintenance - Types of hose fittings - Couplings - Component parts of inter locking couplings - Suction coupling wrenches - Branches- nozzles and branch holders - Foam making branches - Nozzles - Collecting head and suction hose fittings - Breechings - Adapters - Maintenance of hose fittings

UNIT -II - Rope- Lines- knots and ladders

Introduction - Manufacturing materials - Types of ropes and size - Cordage - Causes of deterioration of ropes and lines - Different type of knots - Different type of lines - Purpose of knots - Ladders -Introduction - Hook ladder- escape ladder- turn table and extension ladder - Hook ladder belts

UNIT – III - SCBA and foam making equipments

Introduction - Physiology of respiration - Effects of respiration - Essential fetchers of BA set - Description and technical details - Care and maintenance various BA sets - Advantage and disadvantage of various BA set - Foam & foam making equipments - Definition - Different type of foam concentrate - Storage - Characteristics - Foam branch and its type - Mechanical foam generator

UNIT -IV - Pumps- primers- tenders and water relays

Introduction- definition - Deferent types of pumps - Deferent types of primers - Working principle of various pumps primers - Maintenance and troubleshooting - Testing of pumps - Advantages and disadvantages - Water relay system - Open circuit system - Closed circuit system - Different type of tenders and Fire alarm system -Operation and maintenance of various tenders - Water- foam- Co2- DCP and emergency tenders

UNIT -V - Fire Alarm

Introduction of Electronics and Electricity- Semi conductor Physics - Circuit Control And Protective Devices - Transistors - Principles of fire detectors - Parts of fire alarm unit - Control panel - Type of detectors - Automatic fire detection - Classification of detector - Control and indicating equipment - Trouble shooting and maintenance - Intruder alarms

Fire safety procedures: Fire Risk assessment – Control measures to minimize the risk of fire – storage of flammable liquids & gases – structural measures for preventing spread of fire and smoke – electrical equipment to use in flammable atmosphere – Means of escape – Fire Marshal – Fire Drills – Building Plans

References:

1. Fire Service First Responder - Daniel Limmer- Michael Grill
2. Hand book of fire and Explosion Protection Engineering Principles for Oil- Gas- Chemical and Related Facilities - Dennis. P. Nolan- PE
3. Fire Equipment - David L. Bever
4. Engineering Chemistry - Jain & Jain

Core-4- Security Management of Industries

Objective: This course Management of security risks applies the principles of risk management to the management of security threats. It consists of identifying threats (or risk causes)- assessing the effectiveness of existing controls to face those threats- determining the risks' consequence(s)- prioritizing the risks by rating the likelihood and impact- classifying the type of risk and selecting an appropriate risk option or risk response.

UNIT I – Introduction to security management

Introduction – Loss prevention – External threats – Internal Threats - Need of Security Arrangements in Industrial Plants – Risk options – risk avoidance – risk reduction – risk spreading – risk transfer – risk acceptance - Security Program - Fencing and Walls - External Landscape – Lighting

UNIT II – Security Policy implementations

Alarm System – burglar alarms – alarm clocks – distributed control systems – first out alarm – civil defence siren – Alarm management – warning systems - Visitor Entry Pass - Employee entry Pass – Communication - Safe Keys and Locks

UNIT III – Security personnel management

Security Guard Force - Check List for Plant Security - Security Staff Parade Drills – Discipline - Record Keeping – arson control – radio operation – bouncer – door man – body guards

UNIT IV – Physical Security

Protection from espionage- theft & terrorist attack – Deterrence methods – Physical barriers – natural surveillance – security lighting – Intrusion detection and electronic surveillance – sensors – video surveillance – Access control – Mechanical & electronic access control systems – Identification systems and access policies

UNIT V – Security Procedures

Jurisdiction – Organisation and structure – Internal affairs – Police agencies – coordination with external law enforcement agencies – dealing with public – press reporters – fraud management – mock drills

Reference :

1. Effective Security Management- Sixth Edition - Charles Sennewald
2. https://en.wikipedia.org/wiki/Security_management#Physical_security

Allied II : INDUSTRIAL SAFETY MANAGEMENT – 2

Objective: To help students to understand broad aspects of Safety Management like the PDCA cycle- HSEMS- OHSAS 18001 Management System- Policy- Organising- Planning & Implementing- Evaluation- Action for Improvement- Audit- Safety Culture & Legal aspects of Safety

Unit-1 – Health & Safety Management Systems

Defining an effective safety and health management system - The management models- eg. HSG65- BS 8800- OHSAS 18001- ILO-OSH 2001 - PDCA – ILO-OSH 2001 Safety & Health Management System – OHSAS 18001 HSEMS – OHSAS guidelines – ANSI/AIHA Z 10 standard - Policy – Purpose and importance of setting Policy – Key features and contents of Health & Safety Policy

Unit-2 – Organising for Health & Safety

Organising for Health & Safety - setting goals & objectives – Management leadership – Employee involvement – Concept & significance of Safety Culture – Internal and external factors influencing Safety behavior – Improving safety culture and climate- Improving human reliability – Communication -consultation - Work site Analysis – Review of culture

Unit-3 – Risk Management

Risk Analysis & Risk Management – Principles of hazard identification – Hazard analysis & risk control – Quantitative & qualitative assessment - Carrying out a Risk assessment - Preventive and protective measures – Process safety management - Safe Systems of Work – Permit to Work Systems

Unit-4 – Monitoring Health & safety

Active & Reactive monitoring – Investigating Incidents – Fault Tree Analysis – Failure Modes and Effects Analysis – Recording & Reporting incidents - LTI – LTIFR - Safety Training – Safety Auditing - Performance Review

Unit-5 – Principles of Management

Functions of Manager – Planning – Organising – Staffing – Leading – Controlling – Leadership – different leadership styles - the importance of vision- the motive to lead- and organizational climate - various aspects of effective leadership- to include influence- follower motivation and effective followership - role of ethics and values in guiding organizational behavior - methods used to effectively manage groups and teams.

References:

1. Industrial Safety Management – LM Deshmukh
2. ILO Convention – 155 & Recommendation – 164
3. Indian Factories Act 1948
4. ILO Encyclopedia of occupational health and safety
5. Management of International Health & Safety – Roger Passey

Core – 5-Occupational Safety - 1

Objective: This course will enable the students to apply safety and health related theory and technology- analyze workplaces to identify occupational hazards- formulate solutions to control occupational hazards- collaborate with others in their respective organizations to minimize occupational hazards.

Unit-1 - Biological Hazards

Anticipation & recognition – routes of transmission – types of biological agents – bacteria – gram positive bacilli – gram negative bacilli – viruses – fungi – Biological safety – Identifying bio hazards agents – bacteria – rickettsiae – viruses – fungi – parasites – Legionella – Leptospira- Blood borne viruses - Controlling Bio hazards – classes of hazards – sterilization - disinfection

Unit-2 – Chemical Hazards

Chemicals in the work place – recognizing common occupational health hazards – gases – vapours – mists – fumes – Industrial sources – potential routes of occupational exposure – particulates & fibers – Industrial sources – potential routes of occupational exposure – solvents- acids & bases – Industrial sources - potential routes of occupational exposure – acute & chronic effects – GHS classification of chemicals – SDS - Assessment of health risks – control measures – Specific Agents like Asbestos- Carbon monoxide- Cement- Silica

Unit-3 – Electrical Hazards

Electricity – Shock – the Skin- heart- muscle – severity of shock – arc flash – arc blast – Electric circuits and machines – Ohms law – resistance – impedance – electrolyte – fuel cell – equivalent resistance – electromotive force – kirchoff’s rules – conductor – capacitor – insulator – charges – the practical system of electrical units – Electrical power- energy and heat – Electrical systems – direct current – alternate current – transformers – circuit breakers – switch boards & switch gear – protective relays – disconnecting means – Effects of electric current – Protective measures & devices – Electrical grounds – system grounding – equipment grounding – Insulation- isolation & guarding of energized parts – working clearance – Inspection and work practices

Unit-4 – Natural Hazards

Hazard- Risk- Causation and threshold – review of scientific principles for physical agents – physical and physiological systems of units – Human vision – human hearing – exposure guidelines for physical agents – thermal stress – heat stress – cold stress – noise & vibration

Unit-5 – Radiation Hazards

Ionising Radiation – terminology – fundamental quantities – activity and half life – exposure – Roentgen Absorbed Dose – Roentgen equivalent man – radiation sources – external – internal – biological effects – radiation protection principles – time – distance – shielding – contamination and internal hazards – precautionary procedures – record keeping – radiation surveys and personal monitoring – emergency procedures – Non Ionising radiation – principles – effects – visible and ultraviolet radiation – lasers – microwaves – radio frequency radiation – physical hazards – internal heating – skin damage – eye damage – damage by associated equipment – control – electromagnetic radiation – static electric & magnetic field -

References:

1. Occupational Safety & Health Management – Thomas J Anton
2. Safety Professional’s reference & study guide – W David Yates
3. Fundamental Principles of Occupational Health & Safety – Benjamin.O.Alli

Core– 6-Legal Aspects of Safety

Objective: This course will enable the students to familiarize and understand the legal framework governing occupational safety. Emphasis is given on Indian Acts however introduction is also given on various International Acts.

Unit-1 – Indian Factories Act 1948 and 1987 amendments

Approval- licensing and registration of factories – Factories Act - Sections: 7(A)- 7(B)- 7(1)- 7(4)- 7(A-2)- 7(A-3)- 7(B-1) - Section 8 to 36- 36 (A) - 37 to 40 – 40 (A&B) – 41 (A to H) – Section 42 to 49 – Chapters VI to X

Unit-2 – The Building and other Construction Workers (Regulation of Employment and conditions of service) Act - 1996

Chapter-VI- Hours of work – Welfare measures and other conditions of service of building workers – Chapter VII – Safety and Health measures

Unit-3 – The Building and other Construction Workers (Regulation of Employment and conditions of service) Rules – 1998

Part I – Chapter -1- Chapter -2 – Part-II – Chapter-4 – Part III – Chapters-VI to XIX – Chapters XXI to XXIV – XXVII & XXVIII – Schedule 1 to 12

Unit-4 – Introduction to other Acts

Environment Protection Act 1986 - Electricity Rules 1955 - Hazardous waste (Management and handling) rules 2000 - Noise pollution (regulation and control) rules 2000 - Recycled plastic - plastic maintenance and usage rules 1999 - Municipal (Solid waste management and handling) rules 2000 - Pollution (Control) Act 1986 - Bio Medical waste (Management and handling) Rules 2000 - Batteries (Management & Handling) Rules 2001

Unit-5 – Introduction to International Acts- Conventions- Recommendations & ACOPs

USA - 29 CFR 1910 & 1926 – UK – Health & Safety at Work Act 1974 (Modified in 2008) - Management of Health and Safety at Work Regulations 1999 - Construction (Design and Management) Regulations 2007 – Health and Safety (Consultation with Employees) Regulations 1996 - Lifting Operations and Lifting Equipment Regulations 1998 - Reporting of Injuries- Diseases and Dangerous Occurrences Regulations 1995 - ILO - Convention on occupational health and safety 155 - Occupational safety and health recommendation 164 - Code of practice – safety in the use of chemicals at work - safety and health in construction.

References:

1. Indian Factories Act – 1948
2. Indian BOCW Act – 1996
3. BOCW Rules - 1998
4. ILO - Convention on occupational health and safety 155
5. OSHA - 29 CFR 1910 & 1926
6. UK – Health & Safety at Work Act 1974

Allied-3 – Personality Development

UNIT –I What Makes A Winning Personality- Personality Defined- Determinants of Personality- How Personality is Developed

UNIT-II Corporate Theories on Personality Development-The Development Process-What Makes A Winner

UNIT-III Building Self – Esteem and Self – Confidence-Indicators of a Positive Self – Image-Indicators of a Negative Self – Image-The Development of Self

UNIT –IV Image and Self – Esteem- Self – Esteem and Maladjustment

UNIT-V Behavioral Manifestations of Woundedness-Therapy for Wholeness and Wholesome Self – Esteem

Reference Book:

Roldan - Amelia Samson .

A Workbook on Personality Development and Character Building. AR SKILLS
DEVELOPMENT AND MANAGEMENT

Skill Based Subject 1- Maintenance of Fire Protection Systems

Objectives: To familiarize students with the design- installation- working and use of different types of Fire protection systems for low and high residential- commercial and public buildings. This has the blending mixture of both Learning and Skills.

UNIT-1: Fire extinguishing appliances. Selection- requirements- installation and maintenance of hand appliances. Mechanically driven fire engines and trailer pumps. Hydrant system- pumps- Fuel System- Fixed monitors- Hose pipes and Nozzles- Maintenance of pumps- Hydrants hose pipes and nozzles.

UNIT-II: Sprinkler system- installation of sprinkler system- piping and fittings. Pressure gauges- Installation of control valves- Maintenance of sprinkler installation- Fire protection requirements for buildings and riser system. Classification of buildings based on occupancy. Fire protection- static water storage tanks. Preparation of plans- Signs and symbols used in the drawing- Drawing instruments and their uses.

UNIT-III: Fire alarm Systems- Automatic fire detection- Principles of automatic fire detection- Types of system- definition of detector- Classification of detector- Success or failure operation- Fire Products- smoke detectors- optical detector- Radiation detector- infra red detector- ultra violet detector- heat detector- advantages and disadvantages of detector.

UNIT-IV: Linear heat detectors.- Radio based systems. Automatic fire detection circuits. Theory of open circuit and closed circuit- Detector and alarm circuits. Wiring and power supplies.

UNIT-V: Control and indicating equipment- general- Zones- Power supplies- Faults- Developments- Monitoring the system- Maintenance- Visual display- Examples of control and indicating equipment- Event location message- Remote manned centre. Detector positioning - Manually operated fire alarms. Block diagram of a fire alarm systems

References:

1. Fire Safety In Building By: V.K. Jain Publishers: New Age International Publishers Edition: 2nd Edition
2. Electrical And Mechanical Service In High Rise Buildings ,Design and Estimation Manual By: A.K. Mittal Publishers: CBS Publishers & Distributors Edition: 1st Edition
3. Design of Water Based Fire Protection Systems By: Robert M. Gagnan Publishers: South Western Dujebury Edition: 1st Edition

Core-7 – Occupational Safety - 2

Objective: This course will enable the students to apply safety and health related theory and technology- analyze workplaces to identify occupational hazards- formulate solutions to control occupational hazards- collaborate with others in their respective organizations to minimize occupational hazards.

Unit-1 – Structural Hazards

Building design – Location of buildings and service functions – designing building to protect against explosions – building and hazard identification – building evaluation – risk reduction measures for building – building design to protect against toxic release – design for emergency egress – checklist for evaluation

Unit-2 –Mechanical Hazards

Hazardous motions and actions – hazard identification – mechanical devices – industrial robots – metal working machinery – general safety rules – personal protection – turning machines – Boring / drilling machines – milling machines – planning machines – grinding machines – cold forming of metals – primary operation – two hand control system – foot operation – secondary operations – clutch & break systems – hydraulic & pneumatic presses – power tools – grinders – saws – circular power saws – table saws – band saws – meter saws – chain saws – pneumatic nail guns – boilers and pressure vessels – high pressure systems – welding & cutting – resistance welding – arc welding – Protection against shock – personal protection

Unit – 3 – Human factors & ergonomics

Fitness for duty – human environment system – training – task analysis – Ergonomic considerations – Manual materials handling – Lifting – Recognizing potential ergonomic problems – Common disorders – Musculoskeletal Disorders - Occupational Bio mechanics – NIOSH Lifting formulae – Organisational- behavioural & psychological influences – Fatigue – Ergonomic hazards & repetitive strains

Unit – 4 – General work place hazards & risk control

Welfare – Sanitation – Housekeeping - HVAC – prevention of falling materials – safe stacking & storage – Violence at work – substance misuse – safe movement of people – working at height – temporary works - Safe movement of vehicles – driving at work – Manually operated and powered load handling equipment – Hand tools – hand held power tools – Machinery hazards – stress

Unit – 5– Personal Protective Equipment Standards

Introduction – requirements of PPE – Head protection – Eye & face protection – body protection – hand protection – foot protection – Respiratory Protective Equipment – fit testing – Fall protection – working over or near water

References:

1. Occupational Safety & Health Management – Thomas J Anton
2. Safety Professional's reference & study guide – W David Yates
3. Fundamental Principles of Occupational Health & Safety – Benjamin.O.Alli

Core – 8-First Aid & Emergency Procedures

Objective: The First Aid & Emergency procedure like CPR is to help students to develop the knowledge- skills and confidence to respond in a medical emergency. Varied ways of exposing the students will create better retention. As a result- students develop more confidence in their ability to respond to an actual emergency.

Unit-1 – First Aid Provider

Introduction – Legal considerations – Recognizing an emergency & deciding to help – personal safety – removing contaminated gloves – Emergency medical services – **Sudden Cardiac Arrest** – Respiratory & circulatory systems – sudden cardiac arrest & early defibrillation – chain of survival

Unit-2 – Basic CPR Skills

Chest compressions – Rescue breaths – primary assessment : unresponsive person – **Basic Life Support Care** : unresponsive & breathing – unresponsive & not breathing – automated external defibrillators – basic AED operation – using an AED – trouble shooting – choking

Unit-3 – First Aid Assessment

Primary assessment – responsive person – Secondary assessment - caring for serious injury – control of bleeding – Tourniquets – improvised Tourniquets – Internal bleeding – managing shock – head- neck or back injury – spinal motion restriction – swollen painful deformed limb – splinting – using improvised rigid splint

Unit – 4 – Burns & sudden illness

Burns – chemical burns – electrical burns – Caring for sudden illness – warning for sudden illness – altered mental status – stroke – diabetic emergencies – seizure – breathing difficulty- shortness of breath – Asthma – severe allergic reactions – pain – severe pressure – discomfort in the chest – severe abdominal pain – Poisoning – ingested poisoning – inhaled poisoning – Heat exhaustion – Heat stroke – hypothermia – frost bite

Unit-5 – Specific First Aid Topics

Caring for specific first aid problems – Amputation – impaled object – open chest injury – open abdominal injury – impaled object in the eyes – Chemicals in the eye – nose bleed – injured tooth – pregnancy complications – bites and stings – snake bites – spider bites – stinging insects – tick bites – marine animal stings – human & animal bites

References:

1. Heart saver 1st Aid CPR AED Student Book - Laedral
2. St. John Ambulance Reference Guide on First Aid

Allied 4 – Communicative English

Objective : To enhance the communicative skill of students and enable them to use English in a confident and natural way.

UNIT –1: An Introduction to Communication Skills – Vocabulary - Idioms & phrases – Adjectives used for appreciation - Polite requests - Greetings - expressing gratitude – apologizing – complaining - words & phrases to express attitude.

UNIT- 2: Functional Grammar - The articles - subject verb agreement – tenses - Question tags - framing questions - Active voice & passive voice - direct & indirect speech.

UNIT – 3: Writing Skill - Letter writing (formed & informed) - Business correspondence - Report writing - Dialogue writing.

UNIT– 4: Common Errors in English - Debate – Group discussion

UNIT– 5: Interview skills - C V Writing

Reference books:

1. Senior school grammar & composition – Hester Lott (Orcent Blackswan ELT)
2. Dictionary of common errors – N D Turton, J B Heaton (Longman- www.longman.com)
3. English in situation – R.O. Neil (OOP)
4. Spoken English- R.K.Bansal & J.B. Harrisan
5. A communicative grammar of English – Geoffrey Leech & Jan

Core – 9-Occupational Health & Hygiene Management

Objective: The students will understand about the prevention of ill-health from work- through recognizing- evaluating and controlling the risks. In fact "occupational hygiene" is both an aspect of preventative medicine and in particular occupational medicine- in that its goal is to prevent industrial disease- using the science of risk management- exposure assessment and industrial safety. Ultimately students will be able to implement "safe" systems- procedures or methods to be applied in the workplace or to the environment.

Unit-1 – Important ingredients of health

Introduction – Health – Use of mind body communication to maintain wellness – emotional wellness – components of food – function of food – essential constituents of food – working of body organs – immune system – balanced diet – principal systems of body – importance of exercise – tips for happiness – occupational health awareness

Unit-2 – Occupational health - 1

Introduction – Occupational health risks – health hazards at work place – occupational diseases – care of skin – Back ache – effect of dust on lungs – airborne dust in working environment – physiology of respiratory system – pulmonary function tests – diabetes over view – prevention and treatment of infectious diseases – prevention and cure of TB – care of liver – insomnia – healthy living – role of occupational health services

Unit-3 – Occupational health - 2

Noise in industry – Occupational hearing loss – Swine flu (H1N1) – Need for occupational health care – Ergonomic risks & hazards – role of occupational health physician - knowledge about HIV & H1B – Ways to reduce occupational risks – functions of occupational health department – Ergonomics – ILO convention – measures for occupational health & safety

Unit-4– Occupational health - 3

Compensation & rehabilitation - Working women – working children – ESIs and other insurance schemes – tips to improve occupational health & safety – Community health – health services –

preventive medicine – prevention of diseases - illness & healing – degenerative illness – other common diseases – care of eyes- ear- nose- throat- tooth & skin – Diseases : it's causes & cure -

Unit-5– Occupational Hygiene

Introduction – work environment – indoor air quality – assessment of health risk – sources of information – Basic characterization- hazard identification and walk-through surveys - Sampling survey equipment - Dust sampling - Chemical sampling - role and limitations of hazardous substance monitoring - Occupational exposure limits – TWA – STEL - LTEL – significance of TWA – limitations of OEL – application of relevant limits – comparison of international standards – prevention of exposure – compliance with OEL – principles of good practice

References:

1. Principles of Occupational Health and Hygiene - Sue Reed- Dino Pisaniello- Geza Benke and Kerrie Burton
2. Industrial Hygiene and Chemical Safety - M H Fulekar

Core-10 – Occupational Health & Safety Standards

Objective: Students will be able to understand various international standards to be applied in a work place during the course of work. They will be able to locate & apply the scientific standards in different aspects of workplace safety

Unit-1 – OSHA 29 CFR 1910 – General Industry Regulations - 1

Introduction – **Walking working surfaces:** Definitions- General requirements- Fixed Industrial Stairs- Portable metal ladders- Safety requirements for Scaffolding- Manually propelled mobile ladder stands and Scaffolds- – **Exit routes- emergency action plans & fire prevention plan:** Definitions- NFPA 101-2000 Life Safety Code- design and construction requirements for exit routes- maintenance safeguards and operational features of exit routes- Emergency Action Plans- Fire prevention Plans – **Powered platforms- Manlifts and vehicle mounted work platforms:** Definitions- Powered platform standards –

Unit-2 – OSHA 29 CFR 1910 – General Industry Regulations - 2

Occupational health & environmental control: Definitions- occupational noise exposure-computation- – **Hazardous materials :** Acetylene- Hydrogen- Oxygen- Nitrous oxide- Flammable & combustible liquids- spray finishing- storage & handling of LPG- process safety- Hazardous waste operations - **PPE:** Eye & Face protection- Respiratory protection- Fit testing- Respirators- Head protection- Foot protection- Electrical protective equipment- Head protection

Unit-3 – OSHA 29 CFR 1910 – General Industry Regulations - 3

General Environmental Controls: Sanitation- labour camps- Permit required confined space- control of hazardous energy - **Fire protection :** Definitions- Fire brigades- portable fire extinguishers- stand pipe & hose systems- Fixed fire suppression equipment– Compressed Gas and Compressed Air Equipment – Materials handling & storage – Machinery & Machine Guarding – Hand & Portable power tools – Welding cutting & bracing – Electrical – Toxic and Hazardous Substances

Unit-4– OSHA 29 CFR 1926 – Safety & Health regulation for Construction - 1

General Safety & Health Provisions: Housekeeping- illumination- sanitation- definitions- means of egress- emergency action plan - **Occupational Health & Environmental controls:** Radiation- Gases vapours- fumes- mists & dust- Illumination- ventilation- hazard communication- Lead – **Signs signals & barricades:** accident prevention signs & tags- Signalling- Barricades- Definitions – **Material handling storage & disposal:** General requirements of storage- rigging equipment for materials handling- disposal of waste

Unit-5 – OSHA 29 CFR 1926 – Safety & Health regulation for Construction - 2

Welding & cutting: Gas welding & cutting- Arc welding & cutting- fire prevention- ventilation and protection – **Scaffolds :** Definitions- General requirements- additional requirements – **Fall protection:** definitions- fall protection system criteria – **Cranes- Derricks- and Conveyors:** Cranes & Derricks- Conveyors – **Excavations:** Definitions- Specific excavation requirements- protective systems – Demolition – Blasting

References:

1. OSHA 29 CFR 1910
2. OSHA 29 CFR 1926

Skill Based Subject-3- Scaffolding

Objective: To understand the safety standards applicable for scaffolding. To learn about the correct erection and dismantling procedure of scaffolding. To learn the skills required for erection and Inspection of a scaffolding.

Unit-I : Introduction – Scaffolding in construction -Terminology – Types of scaffolding – Scaffolding Hazards – Risk Assessment

Unit-II: Parts of Scaffolding – Ground – Sole Board - Base Plate – Screw Jack – Post – Runner – Bearer – Bracing – Guard Rail – couplings – Platform – Castor – Toe Board – Standards and specifications of all the parts - Management & Control of Scaffolding – Lay out & design

Unit-III: Erection of Scaffolds – safe erection and dismantling – Materials – Stability – Tie procedure – Bracing procedure - Working Platform – Guard Rails – Loading – Free standing & Mobile Towers – Hazards of Electricity – Erection near public roads – Inspection & hand over - Dismantling procedure - competency

Unit-IV: Capacity- Load calculation – Access – Fall protection – Falling object protection – Tube & coupler – Frame – System – suspended - outrigger – Mobile Scaffolds

Unit-V: Safety during erection, dismantling & using scaffolds – Inspection procedure – check list – documentation – PFAS – Scaf Tag – BOCW Act

Reference:

OSHA 29 CFR 1926 – SP – L

Code of Practice for access and working scaffolds – Health & Safety Authority - Dublin

Elective 1 (a) – OHSAS 18001 – HSE Management System

Objective: Students will be able to understand the OHSAS 18001 system requirements- so that it will enable them to implement and monitor the same at their workplaces.

Unit-1 : OH&S Management System Model

PDCA – OHSAS 18001 HSEMS Model – Terms & definitions – Acceptable Risk – Audit – Continual Improvement – Corrective Action – Document – Hazard – Hazard Identification – Ill health – Incident – Interested Party – Nonconformity – OH&S – OH&SMS – Objective – Performance – Policy – Organization – Preventive action – procedure – Record – Risk – Risk Assessment – Workplace

Unit-2 : OH&S Management System Requirements

General Requirements – OH&S Policy – Planning – HIRA – Legal and other requirements – Objectives & Programs –

Unit-3 : Implementation & operation

Resources- Roles- Responsibility- Accountability and Authority- Competence - Training and Awareness – Communication- Participation and Consulting – Documentation – Control of documents – Operational control – Emergency preparedness and Response

Unit-4: Checking

Performance measurement and monitoring – Evaluation of Compliance – Incident Investigation- Nonconformity- corrective action and preventive action – Control of Records – Internal Audit – Management Review

Unit-5: Management Review

Inputs to review – OHS performance result – Benchmarking – actions related to Policy, objectives and performance

References:

1. OHSAS 18001 & 18002 guidelines
2. OHSAS 18001: Designing and Implementing an Effective Health and Safety Management System (Paperback) - Joe Kausek

Elective 1 (b) – Safety Management of Plants during Commissioning & Maintenance

Objective: Students will understand the safety management functions and processes of any plants during the commissioning as well as maintenance period.

Unit-1-Introduction

Introduction – Principles of Safety Management – terms & definitions – Safety Policy – Safety organization in plants – Safety Audit - walk through – Intermediate Audit – Comprehensive Audit – Management Response – Training & Supervision

Unit-2-Organising for plant safety

Management response – training & supervision – Economic aspects – Fixed expenditure – Recurring expenditure – economic benefits – Annual reports – Motivation to Managers & supervisors – motivation to employees – Operation and maintenance procedures

Unit-3-Safety during plant commissioning

Observance of safety during pre-commissioning and during commissioning of plant – Commissioning procedure – Emergency procedures – Human factors – Site emergency plan – Safety rules for commissioning – Safety clearance notice – precautions during plant engineering – observation- trial and handing over – safeguards for operators safety

Unit-4-Safety Management in Operations & Maintenance

Safety aspects in operations and maintenance of electrical plant equipment – types of maintenance and safety process – Electrical maintenance – preventive maintenance – Interface between preventive maintenance & safety – Inspection- testing and repairing program - Safety precautions during maintenance

Unit-5-Trouble shooting

Failures of circuit breakers – failure of main conducting circuit- insulation system – Electrical failure modes of solid insulators – Control room facilities and fault investigation – trouble shooting of substation equipment – functional requirement of earthing systems

References:

1. Testing- Commissioning- Operation and Maintenance of Electrical Equipments – S. Rao

Elective 2 (a) – Disaster Management

Objective: Students will be able to understand various types of disasters- classification of disasters and the disaster management plan

Unit-1 – Understanding Disasters

Introduction – classification of disasters – features of natural disasters – disaster management plan – disaster zoning for natural calamities – Important consideration in disaster management

Unit-2-Disaster Management System

Structure of Disaster management system – constitution of disaster management groups – needs and resources to tackle disaster – pre disaster preparedness – post disaster response and recovery stage – control of emergencies

Unit-3-Planning

Organisation consideration – disaster mitigation measures and sustainable developments – planning for disaster management – national disaster response plan – concept of communication – disaster management plan for industrial plant – rehabilitation and resettlement

Unit-4 – Emergency preparedness and response

General principles of Emergency Plans – On-site emergency plans – off-site emergency plans – medical aspects of emergency preparedness and response – emergency response

Unit-5 – Policies & Guidelines with Case studies

Hazard and Vulnerability Profile India - Disaster Management Indian scenario - India's vulnerability profile - Disaster Management Act 2005 and Policy guidelines - National Institute of Disaster Management - National Disaster Response Force (NDRF) National Disaster Management Authority - States Disaster Management Authority - District Disaster Management Authority - Cases Studies : Bhopal Gas Disaster, Gujarat Earth Quake, Orissa Super-cyclone, south India Tsunami,

References:

1. Disaster Management in India – KN Shastri
2. Disaster Management – NH Mullick

Elective 2 (b) – Industrial Psychology

Objective: Students will be able to understand the various aspects of Industrial Psychology like the individual differences- human relations and human engineering etc. which can be applied in safety management to monitor and control the behavior of humans.

Unit-1- Industrial Psychology - 1

Introduction – Scope of Industrial Psychology – concepts of Industrial Psychology – Individual differences – Human relations – Human engineering – principles of Industrial Psychology – application of Industrial Psychology – selection and placement of personnel – Training & development – performance appraisal

Unit-2- Industrial Psychology – 2

Determination of wage structure – motivation of personnel – vocational guidance and counseling – improvement of morale – human engineering -perception – belief – attitude-behavior – culture – ways to improve human behavior – motivation - consultation

Unit-3-Industrial relations and accidents

Industrial accidents – Human carelessness – accident proneness – physical factors – vision – reaction time – relationship between perception and muscular responses and injuries – relationship between intelligence and injury experience – hearing – emotional instability – marital status – fatigue – illumination

Unit-4 – Work environment & safe behavior

Introduction – Noise – atmospheric conditions – job stress and its effects – stressors – coping with stress – stress in the work place – biomechanics and ergonomics – psychology – human factors – biomechanics – Industrial ergonomics and measurements

Unit-5-Industrial Ergonomics and measurements

Ergonomics applications – anthropometry – guidelines for using anthropometric data – work space – psychology – working environment – accident prevention

References:

1. Industrial Psychology: A Brief Study – KC Dubey
2. Industrial And Organisational Psychology- Vol.2 – HL Kaila

Elective 3 (a) – Safety in Power Plants

Objective: Students will be able to understand the general safety guidelines to manage the inherent risks involved in power plants. They will be guided through the fluid systems- high speed rotary equipment- repair and maintenance- power generation- storage & distribution etc.

Unit-1- General Safety requirements/guidelines

Responsibility of Employer – Common guidelines for various systems in power plants - Boilers and waste heat recovery Boilers – structure & Building – General Safety guidelines for control of fluid systems

Unit-2 – Safety guidelines - 2

General safety guidelines for fuel oil LSHS systems - General safety guidelines for high speed rotary equipment - General safety guidelines for various valves – Gas turbine – fuel pipeline – safety of diesel stations - common causes of failures

Unit – 3 - Maintenance

General provisions – General case in repair and maintenance – operations of mechanical equipment – engine trouble shooting guide – storage and handling of petroleum- fuels- oils etc. Dangers from electricity – electrical quality associated with human injury – electrical hazards and remedies – electrical maintenance - earthing

Unit-4 – General safety precautions for electrical works

Authorisation – protective equipment – use and tear of rubber protective equipment – safety rules for linemen – care and storage of live line tools – working on electrical lines – working on dead lines and equipment: grounding of lines and equipment – line work on poles and towers – HT & EHT cables – precautions in respect of storage batteries

Unit-5- Electric power generation- transmission & distribution

Definitions – general guidelines – first aid – job briefing – hazardous energy control (LOTO) – enclosed spaces – excavations – PPE – ladders & platforms – hand & portable power tools – live line tools – materials handling & storage – Working on or near exposed energized parts – de energising lines and equipment for employee protection – grounding for the protection of employees – testing and test facilities – mechanical equipment – overhead lines –line clearance & tree trimming – communication facilities – underground installations – sub stations – power generation

Reference:

1. Practical boiler operation engineering and power plant- fourth edition - By mallick- amiya ranjan

Elective 3 (b) – Controlling of Environmental Pollution

Objective: Students will be able to understand various aspects of controlling Environmental Pollution in details with sector specific information along with the concerned legal provisions

Unit – 1 – Survival of the environment

Earth summit 1992 – Conflict between the north & south - endangered earth – eye opening symptoms – key issues – what is needed to be done – environmental control regulations in India – control through education – environmental impact assessment – prevention & control of Pollution – protection of environment

Unit -2 – Pollution control agencies and Acts

Central pollution control board –approaches to environmental regulations – compliance to legislations – The Environment protection act 1986 – National environment policy 2004 – functions of the national board for wild life – stipulations of wild life protection act

Unit-3- Environmental Management System

Concept of Industrial Ecology – Environmental Management system concepts – aspects of Environmental Management System — Environmental management systems – legal procedures for environmental safeguard – environmental incidents – continual improvement

Unit-4 - Environmental standards

ISO 14000 – ISO 14000 standards and benefits of Environmental Management system – International environmental guiding principles – International Chamber of commerce chapter for sustainable development – environment management

Unit-5-Environmental Impact assessment

Introduction – sustainable development and EIA – Aspect Impact assessment - Integrated approach in handling safety- environment etc. – Quality Management – Safety Management – Environment Management – development process towards sustainability – forest and bio diversity – Management and waste disposal

References:

1. Industrial Safety & Environment - Anupama Prashar
2. Environmental Management – NK Uberoi

Elective 4 (a) – Safety Training

Objective: Students will be able to understand theoretical principles derived from science behind how information is organized and presented focusing on cognitive and behavioural theories. Students will be able to conduct on the job training- tool box talks- presentations etc. during the course of their work which are very essential in safety management.

Unit-1-Learning Theories and Training Development

Cognitive Theory – Behavioural Theory – ANSI Z490.1 criteria for HSE Training – Management and Administration of HSE Training – Training Development – Training Delivery – Training Evaluation – Documentation and record keeping

Unit-2-Methods of Training Delivery

Safety Training Model – OSHA Training requirements – Laws of learning – stereotypes and expectations – reinforcement – training methods – training media – transfer of training – in person- class room training – web conferencing – Computer based training (CBT) – Web based Training (WBT)

Unit-3-Methods of Training Evaluation

Kirkpatrick's four levels of evaluation – why assess – the benefits of assessment – types of assessment – summative – formative – systematic – who assess and when – methods of assessment and data collection – Benchmarking – types of benchmarking – training evaluation – evaluation approaches

Unit-4-Effectively presenting safety training

How to help people better process and retain information – Why do people forget information – how to remember – teaching for higher level problem solving – training media and techniques – collaborative and active learning

Unit-5- Principles of Teaching

Motivation – Impression – Understanding – Repetition – Availability – Continued availability

Reference:

1. Systematic Safety Training - Hendrick

Elective 4 (b) – Principles of Risk Management

Objective: Students will be able to identify- evaluate and mitigate risk in every aspect of management and operations. This course offers a holistic approach- bringing together all elements of risk management.

Unit-1-Introduction

Ten elements of risk area – business structures – self employed – partnership – private limited companies -10 Ps of risk management –

Unit-2-Identifying risk factors

Risk Assessment – Identifying hazards – Risk factors – physical properties – security risk – product or service – competitive risk – purchasing – people elements – people –procedures – protection- processes – performance – planning – policy

Unit-3 – Evaluating the hazards & Risks

Likely results from exposures – rating the extent of potential harm – evaluating the likelihood that harm will occur

Unit-4-Controlling the Risks

Control Measures – Physical controls – Behavioural controls – organizational or procedural controls – systems of control – employment controls – legislative controls – security controls – competitive controls – financial controls – deciding priorities for action

Unit-5-Case studies

Health services – Call centers – Food production and processing – Engineering and manufacturing – Management strategies to manage risks – planning – stakeholders and spreading the risks - Policies

Reference :

Risk Management – 10 Principles – Jacqueline Jeynes

SYLLABUS FOR PRACTICAL SESSIONS

Core-Practical –1- Fire Science

1. PERFORM THE SQUAD DRILL AND TO VERIFY IT'S APPLICATIONS IN FIRE SERVICES: Identification of Squad Drill- Working of Squad Drill and Importance of Squad Drill. What is Squad- Procedure for Formation of Squad- File- Rank- Sizing- Fall in- Fall Out- Various types of Cautions given to the Squad.

2. IDENTIFY AND PERFORM THE MOVEMENTS OF A SQUAD : Attention- Stand at ease- Stand easy- Mark time- Double mark time- Right dress- Left dress- Dress up- Open order march- Close order march- Forward march- Backward march- Steps to the right- Steps to the left- Directions of a Squad- Turning to the left- Turing to the right- Right about turn- From the right number- As you were- Proving of Parade.

3. IDENTIFY THE MARCHING OF A SQUAD: Quick march- Double march- Slow march- Right turn- Left turn- Halt- Forward- Break up- Change direction- Change formation- Reformation of Squad- Saluting- Reporting- Getting on Parade- Inspection Parade- Guard of honour.

4. STUDY THE USE OF ROPES AND LINES IN FIRE SERVICE : Types and construction- material used in construction of ropes and lines. Different types of lines used in fire service for different purposes like rescue- lifting- lowering. Care and maintenance of ropes and lines.

5. IDENTIFICATION- SELECTION- OPERATION AND MAINTENANCE OF FIRE EXTINGUISHERS: Identification of different types of Fire Extinguishers {Water Expelling type- Foam type- DCP type- CO2 type} With respect to constructional feature- capacity operation and use. in fires- It's effective application in extinguishment- Recharging procedure- Care and Maintenance- Performance test- Hydraulic test Inspection procedure -Weekly-monthly- quarterly- half yearly- yearly.

Core -Practical -2– Construction Safety

Students must visit one or two construction sites and prepare any TEN of the following:

HSE Policy
Project HSE Plan
Organisation chart
Emergency plan
Environmental Plan
Lifting Plan
Hazard / Risk Log
Fire Safety Plan
Permits
SOPs
ACOPs
Best Practices
Work Instructions

Injury Log
First Aid Log
Accident report
Accident Investigation report
Accident Record
Near Miss Report & Record
Illness record
Preparation of agenda points- minutes of meeting- Report of meeting pertaining to Safety Committee
Inspection Check list & report
Internal Audit Check list & report

Core-Practical -3– Fire Technology

STUDY DIFFERENT TYPE OF KNOTS: Rescue knots: Bow line- Running bow line- Bow line on the bight- Chair knot. Self rescue knots: Slippery hitch- draw hitch. Other knots: Loop- Half hitch- Thumb knot- figure of eight- Clove hitch- Rolling hitch- Round turn two half hitch- fisherman's hitch- waterman's hitch- Cat's paw- Sheep shank- Single sheet bend- Double sheet bend- Reef knot- carric bend- midshipman hitch. Construction and application of guide lines.

PERFORM FIRE FIGHTING HOSE DRILL: Hose Drill Actions: Lifting hose- Lowering hose- Carrying hose- Laying hose- Connect hose- Disconnect hose- Under running- Remove the kink- Rolling. Identification of different types of hose fittings and their uses.

PERFORM HYDRANT DRILLS: 3 -man Hydrant Drill: Drill procedure with application of Hose and Hydrant Fittings: Add one length of hose- Remove one length of hose- Replace the burst Hose- Divide one line into two line using Dividing Breeching- Collect two line into one line using Collecting Breeching- Hydrant Gears and its operation.

PERFORM HYDRANT DRILLS: 4 -man Hydrant Drill: Drill procedure with application of Hose and Hydrant Fittings: Add one length of hose- Remove one length of hose- Replace the burst Hose- Divide one line into two line using Dividing Breeching- Collect two line into one line using Collecting Breeching- Hydrant Gears and its operation-

IDENTIFICATION- SELECTION- OPERATION AND MAINTENANCE OF FIRE EXTINGUISHERS: Identification of different types of Fire Extinguishers {Water Expelling type- Foam type- DCP type- CO2 type} With respect to constructional feature- capacity operation and use. in fires- It's effective application in extinguishment- Recharging procedure- Care and Maintenance- Performance test- Hydraulic test Inspection procedure -Weekly- monthly- quarterly- half yearly- yearly.

IDENTIFY THE USE OF FIRE SERVICE LADDERS: Types of ladders- their construction- uses- identification of parts- care and maintenance of ladders.

CARRY OUT FOUR MEN DRILL FORMATION OF CREW: individual working procedure on get to work command- ladder pitching- climbing- rescue operation- fire fighting- ventilation procedure- ladder carrying- drill report.

CARRY OUT STANDARD TESTS OF LADDER: String test- round test- standard line test- acceptance test- deflection test.

FIRE TENDER DRILL 6 -MAN WATER TENDER DRILL: Mounting procedure- Dismounting procedure- Individual working procedure like -working with ladder- Application of different types of signals applied during pump operation- working with B.A. set- Soft suction- Hard suction.

IDENTIFY FOAM MAKING BRANCH PIPES: Protein Foam- Aqueous Film Forming Foam (AFFF)- Foam Making Branch 5X (FB 5X) - Foam Making Branch 10 X (FB 10X) - Inline inductor- Pick -up -tube.

STUDY BREATHING APPARATUS SET: Study- working- identification of different parts of BA- Donning Procedure- Pre-Entry Test- BACO- Tally- Searching operation procedure with Guide Line and Personnel Line- Entrapped Procedure- Use of Y manifold.

STUDY OF SMALL GEARS USED IN FIRE SERVICE: Grouping of Small Gears with examples – Fireman Axe- Ceiling Hook- Drag Hook- Fire Beater- Door Breaker- Steel shod lever- Pad Lock Remover- Persuader- Spreader- Cutter- Bending Bar- Quick Release Knife- Shears- Bolt cutter- Search light- Focusing light. Study of hydraulically operated small gears and their use in Rescue Operation Care and Maintenance of small gears

STUDY BREATHING APPARATUS SET: Study- working- identification of different parts of BA- Donning Procedure- Pre-Entry Test- BACO- Tally- Searching operation procedure with Guide Line and Personnel Line- Entrapped Procedure- Use of Y manifold.

Core Practical-4 : Security Management of Industries

1. **IDENTIFY AND PERFORM THE MOVEMENTS OF A SECURITY SQUAD:** Attention- Stand at ease- Stand easy- Mark time- Double mark time- Right dress- Left dress- Dress up- Open order march- Close order march- Forward march- Backward march- Steps to the right- Steps to the left- Directions of a Squad- Turning to the left- Turing to the right- Right about turn- From the right number- As you were- Proving of Parade.

2. **IDENTIFY THE MARCHING OF A SECURITY SQUAD:** Quick march- Double march- Slow march- Right turn- Left turn- Halt- Forward- Break up- Change direction- Change formation- Reformation of Squad- Saluting- Reporting- Getting on Parade- Inspection Parade- Guard of honour.

3. **FUNDAMENTALS OF SECURITY SKILLS/PRACTICES:** (Practical Field Demonstrations) Access Control/ Frisking- Anti-sabotage Checking- Cordoning and Sealing- Surveillance- Body Search- Premises Search and Area Search. Handling and Operating basic Fire-fighting Equipment. Close quarter combat Techniques. Cordoning and Providing Security Cover to a Threatened Person in Crowded Places. Handling and Operation of Wireless Communication Equipment

Core Practical-5- First Aid & Emergency Procedures

1. First Aid Priorities & Managing Incidents
2. Basic Life Support
3. Examination of a Casualty
4. Unconsciousness
5. Control of Bleeding, Fractures, Burns and Scalds
6. Burns and Scalds
7. Regulations
8. First Aid Kits
9. Recording and Reporting
10. Wearing & removal of Gloves
11. CPR – Chest compressions, rescue breath, CPR shield
12. Emergency evacuation Drill

Skill Based Subject-2 – Practical: Maintenance of Fire Protection Systems

1. Hydrant fire drills, study operation, Maintenance ,Visit to sprinkler fitted buildings/houses.
2. Study of Fire Protection plan and drawings Emergency Evacuation mock drills,
3. Showing the method of operation by dismantling and assembling, smoke detector and sprinkler
4. Practical explanation by showing circuit and Fire alarm,
5. Site Visit to visualize the installation of Fire extinguishing appliances in multi storied buildings, hotels etc.

Skill Based Subject-4- Scaffolding – Practical

1. Familiarise with parts of a Scaffold
2. Planning a Scaffold construction with diagrams & Erecting a 2 lift X 2 bay supported scaffold
3. Dismantling of Scaffold
4. Inspection of a completed Scaffold
5. Site visit

Practical for Elective – 01 (a) – OHSAS 18001 HSE Management System

1. Prepare OHS Policy for a medium sized organization
2. Prepare an Organisation Chart & define roles & responsibilities
3. Conduct any two Active monitoring systems & make a report:
 - (a) Site Inspection
 - (b) Survey of Safe Systems
 - (c) Health surveillance of workers
 - (d) Statistical analysis of accidents & near misses for a period of 6 months
4. Conduct an Internal Audit as per OHSAS 18001 & 18002 & prepare an Audit report with major & minor Non Conformities

Practical for Elective – 01 (b) – Safety Management of Plants during Commissioning & Maintenance

Conduct safety audit of a plant
Prepare a standard operating procedure for maintenance work of a plant
Prepare a checklist for inspection

Practical for Elective – 02 (a) – Disaster Management

1. Conduct Vulnerability & Risk Assessment for a medium sized enterprise and prepare a disaster management plan.
2. Collect information and prepare a report on any one disaster happened within last 10 years.
3. Develop and conduct a presentation based on the above report- to a group of audience.

Practical for Elective 2 (b) – Industrial Psychology

1. Interview few workers and note down their behaviour patterns & complaints etc.
2. Conduct a Behaviour Safety Observation and prepare a report to the management
3. Organise a meeting of a group of workers and discuss with them their health and safety concerns while working in the site.
4. Prepare a draft report as to how to motivate the workforce with specific ways and means to achieve higher worker satisfaction levels.

Practical for Elective – 03 (a) – Safety in Power Plants

1. Prepare general Safety Guidelines for the following:

- (a) Boilers
- (b) Control of fluid systems
- (c) Various types of valves
- (d) Maintenance of Machinery
- (e) Working on electrical lines

Practical for Elective 3 (b) – Controlling of Environmental Pollution

1. Conduct a Quality Audit of a work place and prepare a report
2. Conduct an Aspect Impact assessment and document it
3. Prepare an Environment protection Policy for a medium sized organisation
4. Conduct a survey on waste management in an organisation and prepare and SOP for safe handling, storage & disposal of the waste

Practical for Elective – 4 (a) – Safety Training

1. Prepare content for a Tool Box Talk for 10 minutes on any topic related to construction safety and present it to a group of audience.
2. Prepare- conduct and document a Training Need Analysis form
3. Based on the above TNA- prepare a Training Syllabus- PPTs- Trainer notes- Student hand outs- posters etc.
4. Conduct a live training session on above topic for 40 minutes
5. Develop an evaluation form / questionnaire and conduct the course evaluation. Mark the evaluation sheet and take overall class percentage
6. Develop a feedback form- get it filled up during above class and analyse the grading

Practical for Elective 4 (b) – Principles of Risk Management

1. Conduct a general Risk Assessment of a work place using 10 X 10 Matrix and prepare a report to the Management
2. Conduct a Fire Risk Assessment of a work Place