

COURSE OBJECTIVE:

1. To learn about the human body & its various system.
2. To learn about the handling of human casualty, its diagnosis & treatment.
3. To learn about the burn, shock and their types with paramedic care.

COURSE CONTENT:

INTRODUCTION

Definition; qualities of duties, tasks, Study of the human body and its various systems: Skeleton system, Digestive system, Respiratory system, Circulatory system, Central Nervous system & their functions, Practical study of this part to include demonstrations of the human body with structural details of its various parts as seen externally and examination of its internal functions such as pulse, breathing, movements of the chest and abdomen, movements of various joints of the body with structural changes in the body parts while making three movements.

CASUALTY HANDLING-I

Including history taking, making of a diagnosis based on symptoms as Narrated by the casualty and signs as observed by the paramedic. Checking temperature pulse, respiration, blood pressure, swellings, discoloration of the skin, wounds, deformities etc/to confirm the diagnosis. Study of various types of burns and their complications in the indoor cases in burn ward in the local government hospitals. Study of maintenance of various charts related to such casualties and their importance.

CASUALTY HANDLING-II

Study of specific injuries to body parts controlling their functions with external and internal injuries of head chest and abdomen including causes and consequences of external and internal bleeding. Paramedical care of various types of Casualties and their injuries such as wounds, burns, injuries of bones and joints, disturbances in vital function including cardiopulmonary resuscitation, artificial respiration by manual and instrumental methods, bandages, splints, correction of shock, arrest of bleeding, treatment of hyperpyrexia, use of anti/shock fluids and their administration, Observation and maintenance of such casualties.

CASUALTY HANDLING-III

Casualty handling including observation, maintenance of observation charts, treatment administered, temperature-pulse-respiration records, application of suction, appropriate positioning of casualties affected by head injuries, chest injuries, abdominal injuries, bleeding, shock, asphyxia etc. Transportation of casualties on stretchers, across plain ground, through obstacles, stretcher drill, loading and unloading of casualties in stretchers and ambulances, Ambulance installations and their use in casualties during transportation etc.

CASUALTY HANDLING-IV

Casualties affected by heat and cold, drowning, poisoning, pressure, altitude, inebriations, sound, explosions, nuclear radiations etc. Prevention, protection of effects on human bodies and their paramedical care. Bites of animals such as snakes, dogs and various insects and their paramedical care.

COURSE OUTCOME

1. Graduate will be able to explain the various systems of human body.
2. Graduate will be able to evaluate various parameters concerning to human casualty during emergency.
3. Graduate will be able to demonstrate respiratory and non respiratory first aid to human casualty.

LABORATORY

1. To measure the bleeding time and clotting time of healthy adult person using vrigid splints.
2. To calculate the victim dressing time using various type of bandage by first aid responder.
3. To calculate the body mass index of an adult person by using surgical height measuring scale with digital weighting machine.
4. To calculate the blood pressure of an adults person using mercury sphygmomanometer and stethoscope apparatus.
5. To calculate the scale of burn.
6. To perform and practice the different methods of handling and transportation of Victim.
7. To perform and practice the first aid treatment of Fractures in different part of human body.
8. To measure the working efficiency of human lungs with lung testing apparatus.

EVALUATION

Evaluation will be continuous an integral part of the class as well through external assessment.

REFERENCES

Edward T Dickinson , Fire Service emergency care, , Braddy.

L.G Gupta & Abhitabh Gupta , First Aid, Jaypee Brothers.

Watson Jones Fractures and Joint Injuries :

Cantlie, James, First Aid to injured, St John Ambulance Association

First Aid Manual by Indian Red Cross Society.

COURSE OBJECTIVE:

1. To learn about the basic concept of risk and its management in an organization.
2. To teach about popular risk assessment method used in different types of industry.
3. To learn about application and limitation of hazard and operability study and failure mode effect analysis.
4. To learn about the collection application and types of accident data in different types of industries.
5. To learn about fire growth model and their application in calculating reliability index.

COURSE CONTENT:

INTRODUCTION

Concept of Risk, Definition, Accepted & impressed risk, Perception & Quantification Risk, Acceptance Criteria, ALARP, Cost benefit analysis, Component of risk, Strategies of risk control, Principles of risk management, Loss control, Degree of hazards, Elementary reliability Theory, Systems & accidents.

RISK ASSESSMENT

Introduction, Basic quantitative risk assessment (QRA), Principles of QRA, Probability theory, Set theory and boolean algebra, Use of boolean algebra and cut sets, Combination of frequencies, Logic tree approach, Fault Tree Analysis (FTA), Principles and Symbol and Procedure of FTA, Event Tree Analysis (ETA), Quantification of event tree, Quantitative risk assessment, Criteria of risk acceptance, Types of consequences.

TECHNIQUES AND APPROACHES

Introduction to HAZOP, Conducting a HAZOP study, Computerized reporting system, HAZOP of batch process, Extension of HAZOP, Application of HAZOP to human reliability, Failure mode and effect analysis (FMEA), Methodology of FMEA, Critically analysis, Corrective action and follow up.

ACCIDENT DATA ANALYSIS

Introduction, Type of accident & incident data, Collection of accident & incident data, Legal requirement to notify accident & incident, Use of accident & incident data, Accident, Incident, Risk assessment data, Use of Computer, Job safety analysis (JSA), Principle and procedure, Summary of risk assessment methods and comparison.

STOCHASTIC MODEL

Fire growth model, description assumption, Scenario, Output variables, Stochastic input variables, Response surface for maximum temperature, Calculation of time to untenable conditions, Calculation of COHb value, Fatality caused by heat, logarithm of time untenable condition, Calculation of reliability index.

COURSE OUTCOME

1. Graduate will able to explain basic concept of risk and its management.
2. Graduate will able to apply Boolean algebra and cut sets in different risk assessment methods.
3. Graduate will able to demonstrate HAZOP study for a process industry or its distinguish part.
4. Graduate will able to analyze accident and incident data for risk assessment procedure in an organization.
5. Graduate will able to explain fire growth models and scenario for probable fire scenes.

LABORATORY

1. Calculation of individual risk and fatal accident rate as theoretical risk factor
2. Preparing the risk matrix for an organization.
3. Application of Hazard study methods to a raw gas holder.
4. Application of Hazop study on an oil vaporizer.
5. Application of Hazop study on ethylene oxide sterilizer.
6. Application of Fault tree analysis to a chemical reactor.
7. Determination of Safety Integrity level by using risk parameter chart for a given sample.
8. Determination of safety integrity level by using SIL class software with risk parameter chart.
9. Evaluation of preliminary safety instrumented system (SIS) design using SILclass software tool.

REFERENCES

Process Safety Analysis- An introduction, Bob Skelton, Gulf Publishing Company Houston, Texas.
Safety Analysis- Principles and Practices in Occupational Safety, Second Edition, Lar Harms- Ringadahl, CRC Press
Safety at work, John Channing , 8th Edition, Routledge Taylor & Fracis Group Landon & New York.
Risk Analysis in Building Fire Safety Enginneering, A M Hasofer, V R Beck, ID Bennetts, Elsevier.
Practical Hazops, Trips and Alarms, David Macdonald, Elsevier

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Fire Technology & Safety Engineering, VI-Semester

Departmental Elective FT 603 (A) Safety, Health & Environment Laws

COURSE OBJECTIVE:

1. To teach the significance of Factories Act and Rules in Safety Engineering.
2. To learn the provisions related fire prevention and protection in different laws, related to Safety, Health & Environment.
3. To teach the provisions and rules related to pollution control in important legislations.
4. To learn the other important legislations from safety, fire prevention and protection point of view.
5. To learn the provisions related to fire prevention and protection in fire service act and rules.

COURSE CONTENT:

Objective, Definition, Application including chapter-IV, Chapter-IVA, Chapter-IX of Factories Act 1948 and Chapter IX, Chapter-X of M.P. Factories rules 1962, Madhya Pradesh Control of Industrial Major Accident Hazard Rules 1999.

Objective, Definition, Application & provisions related to safety, fire prevention and fire protection in Laws such as Indian Explosive Act 1884, Gas Cylinder Rules 2004, Static and Mobile Pressure Vessel Rules, Petroleum Act 1934 with Rules 2002, Calcium Carbide Rules 1987.

Objective, Definition, Application provisions and rules related to control of pollution in important legislation such as Water (Prevention and Control of Pollution) Act, Air (Prevention and control of pollution) Act, Environment (Protection) Act 1986 with MSIHC Rules, Chemical Accident (EPPR) Rules 1996.

Objective, Definition, Application & provisions related to safety, fire prevention and fire protection in Other Important Legislations like-Boilers Act 1923, Electricity Act 2003 with rules, Dock workers (Safety, Health & Welfare) Act & Rules. Safety & Health provisions of Building & other construction workers (R.E.C.S.) Act 1986 and central rules 1998 and Mines Act.

Provisions related to fire prevention and protection in Delhi fire service Act 2007 and Delhi fire service rules 2010, fire insurance assessment, Public liability insurance Act 1991 with Rules. Objective, Definition, Application, Provisions and Rules related to accidents, Occupational Diseases and Compensation in Employees State Insurance Act.

COURSE OUTCOME

1. Graduate will be able to explain significance of Factories Act and Rules in Safety Engineering.
2. Graduate will be able to explain provisions related fire prevention and protection in different laws.
3. Graduate will be able to explain provisions and rules related to pollution control in important legislations.
4. Graduate will be able to know other important legislations from safety, fire prevention and protection point of view.
5. Graduate will be able to explain provisions related to fire prevention and protection in fire service act and rules.

EVALUATION

Evaluation will be continuous an integral part of the class as well through external assessment.

REFERENCES

Factories Act 1948, M.P. Factories rules 1962

Indian Explosive Act 1884, Gas Cylinder Rules 2004
Petroleum Act 1934, Petroleum Rules 2002
Environment (Protection) Act 1986
Boilers Act 1923
M.P. C.I.M.A.H. Rules 1999
Delhi Fire Service Act 2007 with Rules 2010.
Employee State Insurance Act & Rules.
Building & other Construction workers, (R.E., C.S.) Act. 1996
Other Important Laws related to Health Safety and Environment.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Fire Technology & Safety Engineering, VI-Semester

Departmental Elective FT 603 (B) Safety Management

COURSE OBJECTIVE:

1. Demonstrate knowledge and skills in the area of Basic Concepts and Techniques of Safety Management.
2. To understand the components of Safety Audit and Audit methodologies with relevant Government Agencies.
3. To understand the fundamentals of Accident Investigation and Reporting with its relevance in Accident Prevention.
4. To familiarize with different Accident Indices for Safety Performance monitoring.
5. To understand the importance of Safety Education and Training needs of an Organization.

COURSE CONTENT:

CONCEPTS AND TECHNIQUES

History of Safety movement, Evolution of modern safety concept, General concepts of management, Planning for safety for optimization of productivity, Quality and safety, Line and staff functions for safety, Budgeting for safety, Safety policy. Incident Recall Technique (IRT), Disaster control, Job safety analysis, Safety survey, Safety inspection, Safety sampling, Evaluation of performance of supervisors on safety.

SAFETY AUDIT - INTRODUCTION

Components of safety audit, Types of audit, Audit methodology, Non conformity reporting (NCR), Audit checklist and report, Review of inspection, Remarks by government agencies, Consultants, Experts, Perusal of accident and safety records, Formats, Implementation of audit Indication, Liaison with departments to ensure coordination, Check list, Identification of unsafe acts of workers and unsafe conditions in the shop floor

ACCIDENT INVESTIGATION AND REPORTING

Concept of an accident, Reportable and non reportable accidents, Reporting to statutory authorities, Principles of accident prevention, Accident investigation and analysis, Records for accidents, Departmental accident reports, Documentation of accidents, Unsafe act and condition, Domino sequence, Supervisory role, Role of safety committee, Cost of accident.

SAFETY PERFORMANCE MONITORING

Recommended practices for compiling and measuring work injury experience, Permanent total disabilities, Permanent partial disabilities, Temporary total disabilities, Calculation of accident indices, Frequency rate, Severity rate, Frequency severity incidence, Incident rate, Accident rate, Safety "t" score, Safety activity Rate, Problems.

SAFETY EDUCATION AND TRAINING

Importance of training, Identification of training needs, Training methods, Programmes, Seminars, Conferences, Competitions, Method of promoting safe practice motivation, Communication, Role of government agencies and private consulting agencies in safety training, Creating awareness, Awards, Celebrations, Safety posters, Safety displays, Safety pledge, Safety incentive scheme, Safety campaign, Domestic Safety and Training.

COURSE OUTCOME

1. Graduate will able to apply adult learning theory to safety training methodology.
2. Graduate will able to conduct accident investigations and Accident Data Analysis.
3. Graduate will able to anticipate, recognize, evaluate, and develop control strategies for hazardous conditions at work practices.

EVALUATION

Evaluation will be continuous an integral part of the class as well through external assessment.

REFERENCES

Heinrich H.W. Industrial Accident Prevention McGraw - Hill Company, New York, 1980.

Krishnan N.V. Safety Management in Industry Jaico Publishing House, Bombay, 1997.

Lees, F.P., Loss Prevention in Process Industries Butterworth publications, London, 2nd edition, 1990.

John Ridley, Safety at Work, Butterworth and Co., London, 1983.

Dan Petersen, Techniques of Safety Management, McGraw- Hill Company, Tokyo, 1981.

Relevant India Acts and Rules, Government of India.

Relevant Indian Standards and Specifications, BIS, New Delhi.

Blake R.B., Industrial Safety Prentice Hall, Inc., New Jersey, 1973.

Safety and Good House Keeping, N.P.C., New Delhi, 1985.

Accident Prevention Manual for Industrial Operations, N.S.C.Chicago, 1982.

Journal by Insurance company surveyors and loss assessors – Mumbai – published by Insurance companies.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Fire Technology & Safety Engineering, VI-Semester

Open Elective FT 604 (A) Disaster Management

COURSE OBJECTIVE:

To understand the fundamentals approaches of disaster risk reduction & relationship between vulnerability, disaster, disaster prevention and risk reduction.

COURSE CONTENT:

Types and consequence of major accident hazards, Role of management, Local authorities and public, Disaster Management rehabilitation Cycle - Prevention, Mitigation, Preparedness, Disaster impact, Response, Restoration, Reconstruction, Onsite & offsite emergency planning; Emergency preparedness, rehearsal & exercises.

Role of Insurance in Disaster Management, Role of International co-operation (i.e. NGO & UN Agencies), Effect on environment due to disaster. Need for National Capacity Building and Disaster Knowledge Network

The Disaster Management Act:: Need for technological input in disaster mitigation, community based disaster preparedness program; Preparation of Disaster Management; Plan Early Warning System; Role of Information Technology (IT)

Natural Disaster like Earthquake, Mine fire, flood etc, Dangerous properties of some highly hazardous chemicals, Industrial Disaster due to toxic gas release, Fire or Explosion, Case - Studies.

Accident related Disasters (Forest fires, Air, road, & Rail Accidents, Rural & Urban Fires, Oil Spills, Major building collapse etc, Case Studies.

COURSE OUTCOME:

1. Student will able to evaluate the principles and practices of disaster risk reduction and management.
2. Student will able to know the basic role of public, national/international organizations in disaster management.
3. Student will able to prevention, mitigation preparedness, response and recovery process in disaster management.
4. Students will able to understand distinguish between the different approaches needed to manage pre-during and post disaster periods.
5. Student will able to apply the knowledge in conducting independent DM study including data search and analysis from disaster case study.

EVALUATION:

Evaluation will be continuous an integral part of the class as well through external assessment.

REFERENCES:

Disaster Management Act 2005

Industrial Security Management S.C. Dey

Dangerous Properties of Industrial Material □ Irvin Sex.

Encyclopedia of occupational Health & Safety (OSHA) IV edition.

Safe Handling of Hazardous Chemicals by Rohatgi.

Industrial Fire Hazards Hand Book (NFPA)

Major Hazard Control I.L.O. Geneva.

What went wrong-Trevor Kletz.

Chemical process safety □ Daniel . A. Crawl, Joseph F Louver.

Madhya Pradesh Control of Industrial Major Accident Hazards rules 1999.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Fire Technology & Safety Engineering, VI-Semester

Open Elective FT 604 (B) Process Safety & Risk Assessment.

COURSE OBJECTIVE:

To understand the concept of risk assessment in design and operation with evaluation of threat zone observed during consequence modeling.

COURSE CONTENT:

CONCEPT OF RISK: Definition, Accepted & Imposed risk, perception and qualification of risk, ALARP, cost Benefit analysis.

BASIC QUANTITATIVE RISK ASSESSMENT (QRA): The logic tree Approach, principles of QRA, fault tree analysis, probability Theory, Combination of Frequencies, Event Tree analysis (ETA)

SAFETY IN DESIGN AND OPERATION: Safety in Design safety assurance in design, safety in operation, maintenance, organizing for safety, Accident Investigation and reporting.

HAZOP: Introduction to HAZOP, conducting a HAZOP study, computerized reporting systems. HAZOP of batch process, Extensions of HAZOP, Failure Mode & Effect Analysis (FMEA): Methodology of FMEA, criticality analysis, corrective action and followup.

CONSEQUENCE MODELING: Gas dispersion, Toxicity, Explosions and fires, fires. Human Factors:- The role of the operator, control room design, Human Error Assessment Methods, Application of HAZOP to human reliability, data on operator reliability.

COURSE OUTCOME

1. Student will able to know the basic concept of risk.
2. Student will able to apply QRA , ETA, FTA and other safety methodologies.
3. Student will able to understand safety in design and operation.
4. Students will able to understand HAZOP and its application in risk assessment.
5. Student will able to evaluate threat zone in consequence modeling.

EVALUATION

Evaluation will be continuous an integral part of the class as well through external assessment.

REFERENCES

1. Process safety analysis □ An introduction by Bob Skelton.
2. An introduction to Risk Analysis by Robert E. Megill.
3. Risk Assessments Questions and Answers a practical approach by Pat Perry.
4. Safety sharing the experience - BP Process Safety Series- by www.icheme.org.
5. Fire Safety Risk Assessment- HM Government

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Fire Technology & Safety Engineering, VI-Semester

FT 605 Advance Fire Fighting

COURSE CONTENT:

PUMPS TYPES AND APPLICATION:

Fire water pump characteristics, main and stand by fire pumps, booster fire water pumps, water mist fire water pumps, jockey pumps.

PUMP INSTALLATION, PIPING ARRANGEMENT AND ACCESSORIES:

Typical installation, pump separation, multiple pump installation. Pressure and flow control valves, Flow measurement. Fire sprinklers protection.

FIREWATER PUMP CONTROLLER:

Controller power supplies, Firewater pump acceptance and flow testing- Safety precautions, Periodic performance test, weekly testing, Basic test procedure.

MANAGING INCIDENTS:

Incident Command Development- Fire ground command, Responsibilities and function of command, Establishing command, Command staff, General staff function, Post incident review.

FIRE ATTACK AND FIRE STREAMS:

Sizing up incidents- Lloyd Layman's size up process, Determining fire flow- Kimball rule of thumb, Action plan development – Incident and tactical priorities, scene safety. Solid Streams- Horizontal and Vertical reach, stream penetration, Non solid fire streams- Velocity Flow nozzle reaction.

EVALUATION

Evaluation will be continuous an integral part of the class as well through external assessment.

REFERENCES

Fire Fighting Pumping System at Industrial facilities- Dennis P. Nolan.

Fire Officer Principles and Practice- NFPA.

Fire Department Hydraulics- Evgene Mahoney.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Fire Technology & Safety Engineering, VI-Semester

FT 606 Matlab Programming

COURSE CONTENT:

Matlab

Basic simulation Mechanism and Simulation Tools, Starting and Ending MATLAB, MATLAB Desktop, Help Browser, Types of Files, Command Input Assistance, Operators and Special Characters, Variables and Arrays, Handling Arrays, Useful Built-in Functions, Control Structures, Input/Output Commands, File Handling

Introduction to Plotting

The plot command, Formatting and Labeling a Plot, Multiple Plots, Adding Legend, Sub Plots, Plotting Complex Data, 2-D and 3-D Plots, Plotting a Function, Plot Editor, Interactive Plotting using Plotting Tool

Programming in MATLAB

MATLAB Editor, MATLAB Programming, Debugging MATLAB Programs, MATLAB Debugger, Functions and Function Files, Differential Equation Solver, Symbolic Mathematics, Programming Examples

Basic Applications in accident/incident data

Accident classification- Impact based, Plotting complex accident data, accident data analytics, Analysis of Accident data- Accident forecasting, development of event evaluation algorithm.

REFERENCES

“Modelling And Simulation Using Matlab- Simulink”, 2011 Dr Shailendra Jain, Willey India.

“Matlab Programming”, Rudra prasad.

S. Swapna Kumar, S V B Lenina: MATLAB – Easy way of learning, PHI Learning, 2016

Amos Gilat ,” An Introduction with Applications , 4ed “ , wiley India