



IPS ACADEMY- INSTITUTE OF ENGINEERING & SCIENCE, INDORE

(An Autonomous Institute)

Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal

Scheme of Examination as per AICTE Flexible Curricula

III Semester Bachelor of Technology (B.Tech.)

[Fire Technology & Safety Engineering]

S. No	Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
			Theory			Practical			L	T	P	
			End Sem	Mid Sem. Exam.	Quiz/ Assignment	End Sem	Term work Lab Work & Sessional					
1	HSMC- FT301	Insurance & Risk Management	70	20	10	-	-	100	3	-	-	3
2	HSMC- FT302	Industrial Psychology	70	20	10	-	-	100	3	-	-	3
3	PCC- FT301	Building Drawing & Design	70	20	10	60	40	200	3	-	2	4
4	PCC- FT302	Industrial Hygiene & Occupational Health	70	20	10	60	40	200	3	-	2	4
5	PCC- FT303	Safety Engineering & Its Industrial Application	70	20	10	60	40	200	3	-	2	4
6	PCC- FT304	Field Training in Rescue Operations	-	-	-	60	40	100	-	-	4	2
7	MC 3	Energy & Environmental Engineering	Non Credit Mandatory Course						2	-	0	0
		Total	350	100	50	240	160	900	17	-	10	20
Total Academic Engagement and Credits									27			20

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Fire Technology & Safety Engineering

HSMC- FT301	Insurance & Risk Management	3l:0T:0P (03 Hrs)	03 Credits
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Course Objective:

The objectives of this course are to explain to the student operations of upcoming insurance and banking sector, statutory requirements and understanding of financial environment and market in which they operate.

Course Content:

Module 1 (08 hrs)

INSURANCE AND RISK MANAGEMENT: Introduction to risk, Nature & types of risks, Risk Management Process, Risk and its relation with Insurance, General principles of Insurance, Insurance Terminology, Insurance Application and Acceptance Procedure.

Module 2 (08 hrs)

LIFE INSURANCE: Principles, Products Term Insurance, Endowment Insurance, Pensions, Annuities. Claim Management, Premium payment lapse and Revival, Premium Calculations, Concept of Mortality tables, Assignment, Nomination, Loans, Surrenders, Foreclosure, Reinsurance, Bank assurance, Underwriting Actuarial Profession.

Module 3 (09 hrs)

GENERAL INSURANCE: Principles, Products Fire, Marine, Motor Vehicles, Public Liability, Commercial, Medi-claim and Health Policies, Group Insurance, Crop Insurance etc.

Module 4 (08 hrs)

LIFE INSURANCE POLICIES: Applications in different situations; Important life insurance policies; Life insurance annuities; Important legal provisions and judicial pronouncements 20% in India.

Module 5 (06 hrs)

INSURANCE REGULATORY AND DEVELOPMENT AUTHORITY (IRDA): Functions & importance of IRDA, Legislation on Advisors, Brokers, Corporate Agents, Agents, TPA, Recent developments.

Course Outcome:

At the end of this course student will be able to:

1. Understand the principles of Insurance and their applications.
2. Describe fundamental theories on life insurance.
3. Demonstrate the basic concepts of general insurance.
4. Understand the life insurance policies and judicial pronouncements in India.
5. Describe function and importance of IRDA

List of Text/Reference Books:

1. M. N. Mishra; Insurance Principles & Practice; S. Chand & Co. New Delhi
2. R. M. Shrivastava; Management Of Indian Financial Institutions; Himalaya Publications, New Delhi
3. Arondekar; Principles Of Banking; Iibf; Macmillan India Ltd.
4. Ajay Kumar; Risk Management; Iibf; Macmillan India Ltd.
5. Timothy Koch And S. Mac Donald "Bank Management" New York, Dryden Press
6. Mishra M. N. Life Insurance Corporation Of India- I, II & III Vol. Raj Book & Subscription, Jaipur

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HSMC FT302	Industrial Psychology	3l:0T:0P (03 Hrs)	03 Credits
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Course Objective:

To learn the fundamental of industrial psychology and its applications in occupational health and safety management of an organization through appropriate Industrial Labour Legislations.

Course Content:

Module 1 **(06 hrs)**

SOCIAL AND INDUSTRIAL PSYCHOLOGY: Definition, Nature and Background, Social Perception: Non-Verbal Communication, theories of Attribution, Impression formation and impression management. Social Identity: Self Concept, Self-esteem, Self-efficacy, Self-monitoring and self focusing. Social Influence: Conformity, Compliance and Obedience.

Module 2 **(09 hrs)**

HISTORY OF OCCUPATIONAL HEALTH PSYCHOLOGY: The scope and nature of occupational health and safety- Safety, Welfare, Occupational or work-related ill-health, Environmental protection, Accident, Dangerous occurrence, Hazard and risk. Mental disorder- Alcohol abuse, Depression, Personality disorders, Schizophrenia. Workplace mistreatment- Workplace incivility, Abusive supervision, Workplace bullying, Workplace violence.

Module 3 **(07 hrs)**

OCCUPATIONAL SAFETY: Risk Factors in the Physical Work Environment, Occupational Health Psychology and Occupational Safety, Individual Antecedents of Safety Performance and Workplace Accidents and Injuries, Situational Antecedents of Safety Performance and Workplace Accidents and Injuries.

Module 4 **(08 hrs)**

INTERVENTIONS IN OCCUPATIONAL HEALTH PSYCHOLOGY: Primary Interventions to Improve Work–Life Balance, Secondary Interventions to Improve Work–Life Balance, Tertiary Interventions to Improve Work–Life Balance, Primary Interventions to Improve Physical Health and Safety, Secondary Interventions to Improve Physical Health and Safety, Tertiary Interventions to Improve Physical Health and Safety, Primary Interventions to Improve Psychological Health and Well-Being, Secondary and Tertiary Interventions to Improve Psychological Health and Well-Being.

Module 5 **(09 hrs)**

THE FUTURE OF OCCUPATIONAL HEALTH PSYCHOLOGY: Mental Health, Physical Health, Aggression in the Workplace, Organizational Climate and Leadership, Works–Family Balance, Interventions in the Workplace. Characteristics of behavior under psychological stress, stressful aspects, Industrial Labour Legislation- Labour Legislations in India-Principles Of Labour Legislation- Social Justice, Social Equity, National Economy. Classification Of Labour Laws- Purpose, Legislature, Period Of Enactment. The Factories Act, 1948-Main Provisions Of The Act, Health And Hygiene (Sec11-20), Safety Provisions (Sec 21- 41)

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Fire Technology & Safety Engineering

Course Outcome:

At the end of this course student will be able to:

1. Understand the basic concept of industrial psychology and its application in occupational safety management.
2. Describe fundamental theories and recent empirical research in the field of Occupational health psychology.
3. Apply scientific knowledge to practical health and safety issues in the modern Workplace.
4. Give design solutions to improve the quality of work life and promote workers' health.
5. Familiar with the nature of Industrial Labour Legislation

List of Text/Reference Books:

1. Ck Johri, Labour Law In India (2012) Kns1220 J71
2. Labour Laws - A Primer (2011 Ed.). Eastern Book Company. Pp. 1–224. Isbn 9789350281437
3. P. L. Malik's Industrial Law (Covering Labour Law In India) (2 Volumes With Free Cd-Rom) (2015 Ed.). Eastern Book Company. Pp. 1–3656. Isbn 9789351451808
4. Stavroulaleka And Jonathan Houdmont (2010) Occupational Health Psychology A John Wiley & Sons, Ltd., Publication
5. Probst, T. M., Gold, D., & Cabom, J. (2008). A Preliminary Evaluation Of Solve: Addressing Psychosocial Problems At Work. Journal Of Occupational Health Psychology, 13, 32-42.
6. Levi, I. (2000). Guidance On Work-Related Stress: Spice Of Life Or Kiss Of Death (100 Pages)

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PCC-FT301	Building Drawing & Design	3L:0T:2P (05 Hrs)	04 Credits
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Course Objective:

To learn about the building plans and services with drawing of the major building components through available software.

Course Content:

Module 1 **(08hrs)**

DRAWING OF BUILDING ELEMENTS: Drawing of various elements of buildings like various types of footing, open foundation, raft, grillage, pile and well foundation, Drawing of frames of doors, window, various types of door, window and ventilator, lintels and arches, stairs and staircase, trusses, flooring, roofs etc.

Module 2 **(07 hrs)**

BUILDING PLANNING: Provisions of National Building Code, Building bye-laws, open area, set backs, FAR terminology, principle of architectural composition (i.e. unity, contrast, etc.), principles of planning, orientation.

Module 3 **(09 hrs)**

BUILDING SERVICES: Introduction of Building Services like water supply and drainage, electrification, ventilation and lightening and staircases, fire safety, thermal insulation, acoustics of buildings.

Module 4 **(09 hrs)**

DESIGN AND DRAWING OF BUILDING: Design and preparation of detailed drawings of various types of buildings like residential building, institutional buildings and commercial buildings, detailing of doors, windows, ventilators and staircases etc..

Module 5 **(08 hrs)**

PERSPECTIVE DRAWING: Elements of perspective drawing involving simple problems, one point and two point perspectives, energy efficient buildings.

Course Outcome:

At the end of this course student will be able to:

1. Have basic knowledge various components of building construction that relate to the fire service.
2. Draw the visual elements of drawing (line, shape, value, texture, scale, space, etc.)
3. Familiar with National Building Code and bye-laws terminology.
4. Prepared layouts with detailed drawings of various types of buildings
5. Understand basic building services associated with occupancy.

List of Text/Reference Books:

1. Malik & Meo; Building Design And Drawing
2. Shah, Kale & Patki; Building Design And Drawing; Tmh
3. Gurucharan Singh & Jgdish Singh Building Planning, Design And Scheduling

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List of Experiment:

1. Starting A New Drawing/Opening An Existing Drawing: Setting Up A Drawing Starting From Scratch, Setting Up A Drawing Using A Wizard, Using And Creating A Template File, Opening An Existing Drawing, Screen Layout, Pull-Down Menus, Screen Icons, Command Line, Status Bar, Dialogue Boxes.
2. Drawing Commands: Lines, Ray, Construction Line, Multiline And Polylines, Rectangles, Arc, Circle And Ellipse, Polygon, Spline, Co-Ordinate Input Methods, (Directive, And Absolute, Relative And Polar)
3. Modify Commands: Erase, Trim, Move, Copy, Mirror, Offset, Fillet And Chamfer, Array, Extend, Stretch, Rotate, Break, Scale And Explode.
4. Construction Of Plane And Complex Geometrical Figures: Angles, Triangles, Rhombus, Quadrilaterals, Polygons, Angle Bisectors, Line Divided In Equal Parts, Construction Of Curves And Helix, Principles Of Projections, Projections Of Straight Lines And Solids, Section Of Solids
5. Drawing Settings And Aids: Layers, Load Line Types, Match Properties, World Ucs And User-Defined, Ucs, Drawing Limits And Units, Blocks, Attributes, Individual Project Drawings Of Hydrant Post, Sprinkler Head, Branch Pipe, Water Monitor, Fire Extinguisher, Hose Fittings And Breathing Apparatus.

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Fire Technology & Safety Engineering

PCC-FT302	Industrial Hygiene & Occupational Health	3L:0T:2P (05 Hrs)	4 Credits
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Course Objectives:

1. To have the knowledge of types of storage & handling process of hazardous material.
2. To learn about the understanding of impact of noise during working hours..
3. To have the knowledge to develop confidence for training & workers regarding occupational diseases.
4. To learn about stress related to work hazard.
5. To learn about various communicate risk factor in handling hazardous material. .

Course Content:

Module 1

(08hrs)

INTRODUCTION TO CHEMICAL HAZARDS. Dangerous properties of chemicals, dust, gases, fumes, mists, vapors and smoke. Exposure evaluation and air sampling, There sold limit values. Chlorine Exposure effects. Personal monitoring. Introduction to chemical processes and safety. Storage, Transport and handling of hazardous chemicals. Industrial ventilation. Natural ventilation. Opening in work area.

Module 2

(08hrs)

PHYSICAL HAZARDS. Improper illumination, Thermal radiation, ultra violet radiation, ionizing and non ionizing radiation. Preventive and control measures. Noise-Measurement, Noise-control techniques – Noise Survey, vibration. Thermal stress, heat balance, heat-stress, heat disorders, control measures.

Module 3

(08hrs)

WORK PHYSIOLOGY Classification of workload. Work capacity and man- Job alignment. Fatigue, Physiological tests – diet and exercise for work stress control. Ergonomics, Application of ergonomics in safety and health management, methods of reducing postural strain.

Module 4

(07hrs)

OCCUPATIONAL HEALTH Common occupational diseases such as silicosis, asbestosis, and toxicity related to lead, nickel, chromium, and manganese. Causation of diseases and its effects. Methods of prevention. Compensation of occupational diseases. Occupational dermatitis, occupational cancers, Medical examination of workers, occupational health center, health records, fundamentals of first aid.

Module 5

(09hrs)

PERSONAL PROTECTIVE EQUIPMENTS: Non respiratory personal protective devices: Head protection , Ear protection. Face and Eye protection. Head protection. Feet protection. Body protection. Supply, use, care maintenance of personal protective equipments. Requirements under safety laws. Respiratory personal protective devices: classification of hazards. Selection of respirators. Instructions in use of breathing apparatus. Supply, Training for use, care & maintenance of breathing apparatus

Course Outcome:

At the end of this course student will be able to:

1. Demonstrate the knowledge of types of storage & handling process of hazardous material.
2. Show the understanding of impact of noise during working hours..
3. Develop confidence for training & workers regarding occupational diseases.
4. Understand common occupational diseases with their preventive measures.
5. Communicate risk factor in handling hazardous material.

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List of Text/Reference Books:

1. Occupational Health & Safety in manufacturing Industries – M K Potty.
2. Diseases of occupation – D. Hunter.
3. Code of Practice for Hazardous goods by NFPA
4. Dangerous properties of Industrial materials by Irvin Sex.
5. Handbook of occupation Health & Safety NSC Chicago 1982
6. Encyclopedia of occupational Health & Safety Vol I & II I.L.O. Geneva 1985.
7. Human Factors in Engineering & Design Tata McGraw-Hill 1982

List of Experiment:

1. To carry out survey of noise level by Integrated Sound Level Meter.
2. To evaluate the lung function capacity of human body by Spirometer.
3. To monitor the presence of Ammonia and its control measures.
4. To diagnose the personal hearing capability and hearing loss by the use of pure tone audiometer (Arphi 500 series)
5. To detect the presence of flammable gas by the use of flammable gas detection monitor.
6. To carry out the air sampling survey and dust monitoring using air sampling pump.
7. To evaluate noise dose for a personnel working in noisy area with the help of noise dosimeter.
8. To carry out survey of illumination levels by use of Lux meter.

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PCC-FT303	Safety Engineering & Its Industrial Application	3L:0T:2P (05 Hrs)	04 Credits
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Course Objective:

To understand the fundamental of safety engineering in material handling, operation at different levels with major industrial hazards and their application in emergency planning of an organization.

Course Content:

Module 1 (09hrs)

MATERIAL HANDLING AND MECHANICAL HAZARDS: Principles of Material handling, Material characteristics, Major equipments categories- Positioning equipment, Conveyors and Automatic Guided vehicles, Mechanical injuries- Safe guards and their requirement, Point of operation for guards and devices. Sensing devices for guards- mechanical limit switches and non mechanical actuation, Guard locking systems and devices, Sensor for motion detection, Presence sensing devices- Trip devices, Mechanical trip switches, Trip wires, Pressure sensing mats, Edge detections, Opto electronic presence detector, Light curtains, Control devices for safety.

Module 2 (09hrs)

HAZARDS AND CONTROL AT DIFFERENT LEVEL: Causes and kind of falls, Walking and slipping, Impact and acceleration hazards, Lifting and standing hazards, Forklift safety. Lockout-tagout, log-in procedure, Loto hardware, Energy isolation release from lockout or tagout, Special procedure. Confined space entry- Identification and hazards, Confined space entry procedure and permits, Duties and responsibilities of entrants, Attendants and rescue team, Hot work procedure and permits. Behavior based Safety.

Module 3 (08hrs)

PRESSURE HAZARDS AND VESSEL TESTING: Pressure hazard sources, Boilers and pressure hazard, High temperature water hazard, Hazard of unfired pressure vessels, Measurement and reduction of pressure hazards. Pressure vessels definition, Classification and grading, Examination intervals and principles, Defect and failure, Pressure testing, Types of pressure test, Safety precaution in pressure and hydraulic testing, Leak testing and detection, Leak location methods and leak rate.

Module 4 (07hrs)

EMERGENCY PLANNING: Safety in industries involving hazardous processes- types of hazards in chemical industries, Introduction, Onsite Emergency planning, Developing Emergency plan, Essential function and Nominated personnel, Off-site Emergency planning, Emergency Incidents and emergency Scenarios – case studies.

Module 5 (07hrs)

INDUSTRIAL HAZARDS AND CONTROL: Hazards and their control in the manufacture of articles from refractory materials, hazards in solvent extraction plants and their control, safety in industries, manufacturing rayon by viscose process, hazards and their control in fertilizer industries, hazards and their control in LPG bottling plant.

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Course Outcome:

At the end of this course student will be able to:

1. Recognize major material handling equipment and design safe guards for mechanical hazards prevention.
2. Illustrate hazards during operation at different levels and develop safe operating procedures.
3. Visualize the pressure hazards and plan vessel testing for the organization.
4. Demonstrate emergency planning of an organization in onsite and offsite situations.
5. Identify the major industrial hazards and their control measures.

List of Text/Reference Books:

1. Sam Mannan, Lees' Loss Prevention In The Process Industries, Third Edition Volume-2 Section-19
2. Sam Mannan, Lees' Loss Prevention In The Process Industries, Third Edition Volume-2 Section-24
3. Paul A. Erickson, Practical Guide To Occupational Health And Safety, Academic Press
4. David L. Goetsch. Occupational Safety And Health For Technologist, Engineers And Manager-Third Edition, Prentice- Hall Inc.
5. Dave Macdonald, Practical Machinery Safety, Newnes
6. Dr. K.U. Mistry, Fundamentals Of Industrial Safety & Health, Siddhart Prakashan.

List of Experiment:

1. To visualize and demonstrate the function of mechanical limit switches in EOT crane with the help of sample working model.
2. To plan the requirement and design the safe guards for a sample working model of bucket elevator.
3. To define and demonstrate trip wire function for emergency lock inside the sample working model of conveyor belt.
4. To schematize the safe operating procedure for confined space entry and demonstrate confined space entry operation within the sample model of confined space entry.
5. To perform the pressure vessel test for a given sample of pressure vessel with the help of ultra sonic thickness tester and hand/electric operated hydraulic pump.
6. To recognize and relate the rated load capacity of a sample working model of EOT cranes and interpret it with safe load capacity.
7. To schematize the safe operating procedure for prevention of chlorine leakage and demonstrate the chlorine leakage and its control with the help of emergency kit and neutralization process.
8. To measure the efficiency of exhaust fan for removal of toxic fumes through exhaust duct in a given sample of "acid spread" model..

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Fire Technology & Safety Engineering

PCC-FT304	Field Training In Rescue Operations	0L:0T:0P (4 HRS)	02 Credits
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Course Objectives:

- To understand the Aim, Principle & Instruction Method of Squad Drill.
- To perform the position of Attention, Stand at Ease, Stand Easy, Sizing, Right dress, Dismiss, Step forward/backward March and Side step.
- To understand the tricks of Parade Inspection, how & whom to salute and perform the position of Saluting.

Course Content:

Module 1 **(06hrs)**

INTRODUCTION: Aim of drill, The Principle of good Instructions, Words of command, Timing and Techniques for Instructions..

Module 2 **(06hrs)**

POSITION: Attention, Stand at ease, Stand easy, Turning and Inclining, Dressing, Forming up in Three ranks, Numbering, Open and Close order March, Sizing.

Module 3 **(06hrs)**

MARCHING: Length of pace and time of marching, Marching in quick time, Elementary instruction, Regular pace, Halt, Marching in slow time, Position in marching.

Module 4 **(09hrs)**

CHANGING, BREAKING AND TURNING: Changing step in slow march, changing step in quick march, Breaking into slow march, Breaking into quick march, Turning and Diagonal march in slow time and quick time

Module 5 **(09hrs)**

FORMING: Forming squad on the march in slow and quick time, Marching of in single file, Reforming in three ranks. Practice for word of command, Correction of Faults, Inspection and Handling a Squad, Application of Instruction Techniques, Organizing Instructional Periods.

Course Outcomes:

At the end of this course student will be able to :

1. Conduct Squad Drill of Fire Fighting Crew in an Organization.
2. Trained Fire Fighting crew in different Squad Drills.

List of Text/Reference Books:

1. Drill Manual For Fire Services Of India By Govt. Of India.
2. Fire Fighters Skill Drill Manual By Nfpa

List of Experiment:

1. To Study the Aim, Principle, Instruction Method of Drill
2. To perform the position of Attention, Stand at Ease, Stand Easy, Sizing, Right dress, Dismiss, Step forward/backward March and Side step.
3. To perform the position of March and pace, Turning by numbers, Mark Time, The Halt, Marching in squad, Quick March and The Halt (on the move).
4. To perform the position of 'Right (or Left) ---Turn', Changing direction by wheeling and Changing steps on the March, Forming File from Single File and Forming Single File from File.
5. To study the tricks of Parade Inspection, how & whom to salute and perform the position of Saluting.