IPS ACADEMY- INSTITUTE OF ENGINEERING & SCIENCE, INDORE

(A UGC Autonomous Institute, affiliated to RGPV)

Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal

Scheme of Examination as per AICTE Flexible Curricula

V Semester Bachelor of Technology (B.Tech.)

[Fire Technology & Safety Engineering]

S. No	Course Type	Course Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory			Practical						
				End Sem	Mid Sem. Exam.	Quiz/ Assignment	End Sem	Term work / Lab Work & Sessional		L	T	P	
1	PCC	FT09	Computer Aided Risk Analysis	60	25	15	-	-	100	2	1	-	3
2	PCC	FT10	Pumping Machinery & Fluid Mechanics	60	25	15	-	-	100	2	1	-	3
3	PCC	FT11	Safety Engineering & Its Industrial Application	60	25	15	-	-	100	3	-	-	3
4	PCC	FT12	Special Fire Hazards	60	25	15	-	-	100	2	1	-	3
5	HSMC	HS05	Humanities and Social Sciences Open Courses - I	60	25	15	-	-	100	2	-	-	2
6	IFC	IO-01	Interdisciplinary Foundation Course-II	60	25	15	-	-	100	2	-	-	2
7	LC	FT09(P)	Computer Aided Risk Analysis	-	-	-	60	40	100	-	-	2	1
8	LC	FT10(P)	Pumping Machinery and Fluid Mechanics	-	-	-	60	40	100	-	-	2	1
9	LC	FT11(P)	Safety Engineering and Its Industrial Application	-	-	-	60	40	100	-	-	2	1
10	SBC	FT03(P)	Fire Fighting Practices	-	-	-	60	40	100	-	-	4	2
11	MLC	MLC03	Environmental Studies	-	-	-	-	-	-	1	-	-	Audit
			Total	360	150	90	240	160	1000	14	3	10	
Total Academic Engagement and Credits										27			21

Interdisciplinary Foundation Course (IFC)-II, CIOT-001 (Offered by Computer Science Engineering Department) Foundation of Internet of Things	**Humanities and Social Sciences Open Courses (HSMC) – I, HS05 (Any One Course)** (a) English Language Proficiency (b) German Language (c) French Language (d) Japanese Language (e) Soft Skills and Interpersonal Communication

PCC-FT 09	Computer Aided Risk Analysis	2L:1T:0P (03 hrs)	03 Credits

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:

Module 1 **(08 Hrs)**

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.

Module 2 **(08 Hrs)**

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.

Module 3 **(08 Hrs)**

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.

Module 4 **(08 Hrs)**

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.

Module 5 **(08 Hrs)**

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:

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

1. Explain basic concept of risk and its management.
2. Apply Boolean algebra and cut sets in different risk assessment methods.
3. Demonstrate HAZOP study for a process industry or its distinguish part.
4. Analyze accident and incident data for risk assessment procedure in an organization.
5. Explain fire growth models and scenario for probable fire scenes.

List of Text/Reference Books:

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

PCC-FT 10	**Pumping Machinery & Fluid Mechanics**	**2L:1T:0P (03 hrs)**	**03 Credits**

Course Objective:
To understand the properties of fluids, statics, kinematic and dynamic behavior through various laws of fluids and familiar the working and performance characteristics of various pumps and hydraulic machines.

Course Content:

Module 1 **(10 Hrs)**

PUMPING MACHINERY: Pumps- Reciprocating pump, types, working principle, Centrifugal pump types, working principle, Ejector pump, Air lift pump, Hydraulic Crane , Hydraulic Press, Jet pump, Hydraulic lift. Impact of Jets-force executed by fluid jet on fixed flat plate, curved plate, moving vans, Velocity Diagram, Work done by impact.

Module 2 **(08 Hrs)**

FLUID STATIC'S: Properties of the fluids. Pressure Measurement -Pressure at a point, Pascal's Law, pressure variation in static fluid, Absolute and gauge pressure, manometers, Hydrostatic forces- Forces on plane and curved surfaces, Buoyancy and Flotation: buoyant force, Stability of floating and submerged bodies, Relative equilibrium.

Module 3 **(06 Hrs)**

KINEMATICS OF FLOW : Types of flow-ideal & real , steady & unsteady, uniform & non-uniform, one, two and three dimensional flow, path lines, streak-lines, streamlines and stream tubes-continuity equation for one and three dimensional flow, rotational & irrotational flow, circulation, stagnation point, separation of flow, sources & sinks, velocity potential, stream function, flow net & its applications , method of drawing flow nets.

Module 4 **(08 Hrs)**

DYNAMICS OF FLOW: Euler's equation. of motion along a streamline and derivation of Bernoulli's equation, application of Bernoulli's equation, energy correction factor, linear momentum equation for steady flow; momentum correction factor. The moment of momentum equation, forces on fixed and moving vans and other applications. Fluid Measurements: Velocity measurement (Pitot tube, current meters etc.)- flow measurement (orifices, nozzles, mouth pieces, orifice meter, nozzle meter, venturi-meter, weirs and notches).

Module 5 **(06 Hrs)**

DIMENSIONAL ANALYSIS : Dimensional analysis, dimensional homogeneity, use of Buckingham-pi theorem, calculation of dimensionless numbers, Flow through Pipes -Friction losses in pipes loses due to sudden enlargement and contraction, energy gradient lines, siphon, pipes in series and parallel, branching of pipes, water hammer problem, Reynolds experiment & Reynolds number, laminar & turbulent flow, Introduction to Navier Stokes' Equation, relation between shear & pressure gradient.

Course Outcome:

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

1. Application of pumping machineries and hydraulic systems.
2. Explain the types of fluids & its characteristics.
3. Measure the fluid pressure & its velocity.
4. Classify the fluid flow and solve problems of flow through pipes.
5. Define the properties of the fluids.

List of Text/Reference Books:

1. Streeter VL, Wylie EB, Bedford KW; Fluid Mechanics; Mc Graw Hills
2. FOX , McDonald Pritchard , Fluid Mechanics Wiley students edition
3. White ; Fluid Mechanics ; Mc Graw Hills
4. Cengal; Fluid Mechanics; Mc Graw Hills
5. R Mohanty; Fluid Mechanics; PHI
6. K L Kumar Fluid Mechanics
7. Fluid Mechanics & hydraulic Machines , Modi & Seth
8. CS Jog , Fluid Mechanics Volume II CAMBRIDGE IISc Series , Third Edition
9. Dr. D.S. Kumar; Fluid Mechanics and Fluid Power Engineering; S.K. Kataria & Sons
10. S. Ramamrutham ;Hydraulics Fluid Mechanics and Fluid Machines;Dhanpat Rai PublishingCompany(P) Ltd.
11. Dr. R. K. Bansal; Fluid mechanics and Hydraulic Machines;Laxmi Publication (P)Ltd.

PCC-FT 11	**Safety Engineering & Its Industrial Application**	**3L:0T:0P (03 Hrs)**	**03 Credits**

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)**
EMERGNECY 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.

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 measuress.

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.

PCC-FT 12	**Special Fire Hazards**	**2L:1T:0P (03hrs)**	**03 Credits**

Course Objectives:
To learn about the special locations for hazards such as aviation industry, marine and high-rise building with their control measures.

Course Content:

Module 1 **(08 Hrs)**
Constructional features of an Air Craft, Types of Engines, Basic Fire-Hazards in Aircraft, Nature of Air Crashes, Emergency Landings including belly leading; Access to Fire Service Personnel and Escape of trapped persons problems, Types of Safety Belts, Ejection-Seats; and their methods of release; Rescue and Fires in Air Craft and methods of fire-fighting; Problems of fire-fighting. Problems in dealing with Air Craft carrying ammunition, bombs nuclear weapons, Action to be taken in case of accidents involving Radio Active Cargo.

Module 2 **(08Hrs)**
Hazards in Airport, Protection & Types of Hangers, Refueling and Defiling in Air Cargo, Crash Fire Tender: Provision of Crash, Fire Tenders including Rapid Intervening appliances, Categorization of Air- Port, their extinguishing media and determination of the appliances for each category as per International Standard

Module 3 **(08 Hrs)**
Marine Fire- The maritime environment, organizational role, vessel types, construction & systems of fire detection & suppression systems, Vessel plans, drawings & documents, cargo vessel hazards & safety, Incident strategies & tactics training & planning, vessel fire incidents, Marine incidents & Rescue operations.

Module 4 **(08 Hrs)**
HIGH RISE BUILDINGS Fundamentals of Fire Safe Building design, Building and site planning for fire-safety, structural integrity during fire confinement of fire in building, Life safety systems for high, rise structures. Evacuation: Need of Evacuation plans in high rise buildings, Making of Evacuation Plans, types of Evacuation, Procedure of Evacuation.

Module 5 **(06 Hrs)**
Alarm signaling in high-rise building – Smoke movement in building – Residential high-rise building- High-rise building with complex occupancy. Basic fire-fighting strategy. Study of model code of practice for high-rise building in metropolitan cities (Building Bye Laws)..

Course Outcome:

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

1. Explain constructional features of air craft with safety measures.
2. Describe hazards and their protection in all category of airport.
3. Explain vessel plan, drawing and document used in marine.
4. Explain life safety systems in high-rise buildings.
5. Describe building bye laws in metropolitan cities.

List of Text/Reference Books:

1. Aero plane knowledge for Rescue Personnel by F. Engineering Division.
2. Fire Protection and Maintenance of Aircraft by N.F.P.A.
3. The Fire Hazards of Fuelling Aircraft in the Open by D.S.I.R., H.M.S.O. London.
4. I.C.A.O. Standard
5. Marine fire manual
6. High-Rise building fires and fire safety – N.F.P.A.
7. High-Rise Fire & Life Safety by B. Hagan
8. N.F.P.A.
9. National Building Code of India.

HSMC- HS 05	**Soft Skills & Interpersonal Communication**	**2L: 0 T:0P (02hrs)**	**02 Credits**

Course Objectives:
The course will help students to learn effective communication skills, group and team building skills. It will help them to learn the goal setting process and thus become more effective in achieving it.

Course Contents:
Module-I
Introduction to Soft Skills
Importance of Soft Skills, Effective Communication Skills, Verbal: Oral and Written, Merits and De-merits. Non Verbal: Kinesics, Proxemics, Haptics, Chronemics, Paralanguage, Sign/Symbol, Meta Communication, and Cultural differences in Non-Verbal Communication

Module-II
Aspects of Communication
Process of Listening, Types of Listening, Barriers to Listening, Strategies to Develop Listening Skills, Listening Comprehension, Culture as Communication, Communicating across Cultures, Communication Breakdown and ways to overcome

Module-III
Interpersonal Skills
Introduction and Importance to Interpersonal Skills, Personal Attributes, Interpersonal Attributes, Decision making, Creative Problem Solving, Dealing with Glossophobia, , Logical Reasoning
Tony Buzan's Mind Mapping Techniques: Argumentation, Inductive, Deductive reasoning, Persuasion

Module-IV
Group Behavior
Leadership skills, Team Management, Group Dynamics, Negotiation, Assertiveness, Emotional Intelligence

Module-V
Practical Approach to Soft Skills and Interpersonal Skills
Case Studies, SWOC Analysis and Goal Setting, Mindfulness Training, Brain Storming, Group Discussion, Team Building Activities.

Course Outcome:
1. Students will able to develop knowledge, skills and interpret their soft skills and practice correct body language.
2. The students will analyze necessary listening skills in order to follow and comprehend discourse such as presentations, conversations, interviews, discussions and will able to distinguish among multicultural communication
3. The student will be able to demonstrate effective interpersonal communication in a variety of settings and solve a problem by applying appropriate problem-solving techniques.
4. Students will develop an understanding of change processes and be able to think critically about obstacles to change through leadership.
5. The students will be able to practice effective communication skills and presentation skills.

Text Books:

1. Soft Skills by G.S. Chouhan and Sangeeta Sharma, Wiley, New Delhi, 2016 Communication Skills by Sanjay Kumar and Pushplata, OUP, New Delhi, 2011
2. Communication Skill for Engineers and Scientist by Sangeeta Sharma and Vinod Mishra, PHI Learning, New Delhi, 2015
3. Developing Communication Skill by Krishna Mohan, Meera Banerji, McMillan India Limited,2018
4. Effective Listening Skills by Kratz, Abby Robinson. Toronto: ON: Irwin Professional Publishing, 1995.
5. Soft Skill for Everyone by Jeff Butterfield, Cengage Leaning, New Delhi, 2010

Reference Books:

1. Theories of Personality by Hall, Calvin S. et al. . New Delhi: Wiley. rpt. 2011.
2. Corporate Conversations by Holtz, Shel. New Delhi: PHI. 2007.
3. The Art of Public Speaking by Lucas, Stephen E. McGraw-Hill Book Co. International Edition, 11th Ed. 2014.
4. Winning at Interviews by Thorpe, Edgar and Showick Thorpe. Pearson Education. 2004.
5. Business Communication for Managers by Penrose, John M., et al. New Delhi: Thomson South Western. 2007

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New Scheme & Syllabus Based on AICTE Flexible Curricula **(B. Tech)**
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IFC-IO-01	**Foundation of Internet of Things**	**2L: 0T : 0P(2hrs.)**	**2credits**

Course Objective:
The course enables student to understand the basics of Internet of things and protocols. It introduces some of the application areas where Internet of Things can be applied. Students will learn about the middleware for Internet of Things. To understand the concepts of Web of Things

Module I: **(04hrs.)**
IOT - What is the IoT and why is it important? Elements of an IoT ecosystem, Technology drivers, Business drivers, Trends and implications, Overview of Governance, Privacy and Security Issues.

Module II: **(05hrs.)**

IOT PROTOCOLS - Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE802.15.4–BAC Net Protocol– Modbus – KNX – Zigbee– Network layer – APS layer – Security

Module III: **(04hrs.)**
IOT ARCHITECTURE - IoT Open source architecture (OIC)- OIC Architecture & Design principles- IoT Devices and deployment models- IoTivity : An Open source IoT stack - Overview- IoTivity stack architecture- Resource model and Abstraction.

Module IV: **(05hrs.)**

WEB OF THINGS – Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture –WoT Portals and Business Intelligence.

Module V: **(04hrs.)**
IOT APPLICATIONS - - IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications. Study of existing IoT platforms /middleware, IoT- A, Hydra etc.

Course Outcome:
1. Understand the key components that make up an IoT system.
2. Student will understand the concept of protocol used in IoT.
3. Student will earn about architecture of IoT.
4. Student will understand the basics of WoT.
5. Student will understand the different application area of IoT.

List of Text /Reference Books:

1. HonboZhou,"The Internet of Things in the Cloud:A Middleware Perspective ",CRC Press,2012.
2. Dieter Uckelmann,Mark Harrison,Michahelles,Florian(Eds),"Architecting the Internet of Things", Springer, 2011.
3. DavidEasleyandJonKleinberg,"Networks,Crowds,andMarkets:ReasoningAbouta
4. Highly Connected World",Cambridge University Press, 2010.
5. OlivierHersent,DavidBoswarthick,OmarElloumi,"TheInternetofThings–Key
6. Applications and Protocols",Wiley,2012.

LC-FT09 (P)	**Computer Aided Risk Analysis**	**0L:0T:2P (04 hrs)**	**01 Credit**

List of Experiment:

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 SIL class software tool.

LC-FT 10 (P)	**Pumping Machinery & Fluid Mechanics**	**0L:0T:2P (04 hrs)**	**01 Credit**

List of Experiment:

1. To determine the meta centric height of a ship model.
2. To determine the Reynolds's number and the type of flow either laminar or turbulent flow.
3. To determine the co-efficient of discharge for orificemeter and venturimeter.
4. To determine the losses due to friction in pipes.
5. To determine the losses in pipe fitting sudden enlargement and sudden contraction.
6. To determine performance of reciprocating pumps and centrifugal pump
7. To verify the Bernoulli's Theorem.
8. To determine the co-efficient of pitot tube.

LC-FT 11 (P)	**Safety Engineering & Its Industrial Application**	**0L:0T:2P (04 hrs)**	**01 Credit**

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.

SBC FT 03 (P)	**Fire Fighting Practices**	**0L:0T:4 P (04 hrs)**	**02 Credits**

Course Objective:
To learn and teach about the standard practices associated with management, hydrant, hose, pumps and techniques as per foundation training of fire service manual.

Course Content:

Module 1 **(06 Hrs)**
MANAGEMENT OF STANDARD PRACTICES
PSP1- To mount the appliance with a crew of four.
PSP2 - To mount the appliance with a crew of five.

Module 2 **(06 Hrs)**
FOAM STANDARD PRACTICES
F1- To get a foam making branch to work with a crew of four.
F2- To get an Inline foam Generator to work with a crew of five (one delivery)
F3- To get an In line foam generator to work with a crew of five (two deliveries)
F4- To get an in line variable Inductor to work with a crew of five (one delivery)

Module 3 **(06 Hrs)**
HYDRANT/HOSE STANDARD PRACTICES
H1- To replace a burst length of hose with a crew of four.
H2- To divide a length of hose in to two using dividing breeching with a crew of five.
H3- To remove a dividing breeching from a line of hose with a crew of five.

Module 4 **(06 Hrs)**
PUMP STANDARD PRACTICES
P1- To get a pump to work from a hydrant using soft suction with a crew of five (two deliveries)
P2- To get a ground monitor to work with a crew of five.
P3- To get a portable pump to work from open water with a crew of five (two deliveries).

Module 5 **(06 Hrs)**
TECHNIQUES
T1- To effect a rescue using rope and associated equipments with a crew of three.
T2- To effect a rescue using five personnel, an extension ladder, rope and associated equipment.
T3- To define and implement the nine main protocols required to ensure the safe extrication of casualty from an entrapment situation.
T-4 To define and operate the one meter and two meter safe working area around a motor vehicle involved in a road traffic accident.

Course Outcomes:

At the completion of this course, students will be able to:

1.Perform and operates standard practices associated with management, hydrant, hose, pumps and techniques as per foundation training of fire service manual.
2. Apply hose drill performance and practice in fire fighting operation.
3. Apply hydrant drill performance and practice in fire fighting operation.
4. Apply trailer pump drill performance and practice in fire fighting operation.
5. Form standard practices drill performance and practice in fire fighting operation.

List of Text/Reference Books:

1. Fire and Rescue Service Manual Volume-4, Foundation Training and Development, HM Fire Service
2. Inspectorate Publications Section.