

**Vijayanagar Sri Krishnadevaraya University Ballari**



# **SYLLABUS**

**U.G Diploma in Fire and Industrial Safety**

**(I to II Semester)**

**With effect from 2019-20**

### *'Preamble of the Course'*

#### *'Safety is a way of life'*

Safety of human beings poses utmost importance due to rapid competitive environmental conditions. Safety of men and machines has a great concern for any industry due to inbuilt hazards.

The commitment for adherence to safety practices will not only create a safe environment but also boost up the morale and confidence of employees. The first and foremost step in the field of safety is awareness in the subject. Therefore, it is necessary to constantly educate, train and motivate them in all sphere of life.

#### **Objectives:**

1. To introduce new course for the students and to eradicate unemployment.
2. Develop Undergraduate and research level programs for creating professional manpower in Safety Management.
3. For the present competitive world Establish linkages with educational institution and industries to share experience and knowledge.
4. To understand appliances available in the market those promote human safety.
5. To join hand's for a greener tomorrow.
6. Provide innovative, flexible and regular education by using the teaching methodology and by applying modern communication technologies to education.
7. Ensure relevance of program by updating course regularly
8. Help participating students to become more effective decision makers in their knowledge and managerial skills.

## **U.G Diploma in Fire and Industrial Safety**

### **Eligibility:**

PUC/10+2 Equivalent/ 10<sup>th</sup> +ITI/ Diploma Passed candidate are eligible.

### **Course Structure:**

The Under Graduate Diploma in Fire and Industrial Safety Program is offered under semester pattern for two semesters with five papers per semester.

### **Duration and Medium:**

The minimum duration of the Under Graduate Diploma program is one year. The Medium of instruction and examination is in English.

### **Evaluation Procedure:**

Examination (Theory Paper)	70 Marks
Internal Assessment	30 Marks
Total Marks per Paper	100 Marks

## VSK UNIVERSITY BALLARI

### U.G Diploma in Fire and Industrial Safety

#### Semester-I

S.N	Paper Code	Title	Credits	Marks		Total
				Exam	IA	
1	UGDFIS101	Fundamentals of Fire Engineering Science	4	70	30	100
2	UGDFIS102	Fire Technology & Design	4	70	30	100
3	UGDFIS103	Industrial Safety	4	70	30	100
4	UGDFIS104	Environmental Safety	4	70	30	100
5	UGDFIS105	Practicum- I (Field work)	4	70	30	100
<b>Total</b>			<b>20</b>	<b>350</b>	<b>150</b>	<b>500</b>

#### Semester-II

S.N	Paper Code	Title	Credits	Marks		Total
				Exam	IA	
1	UGDFIS201	Safety of People in the event of Fire	4	70	30	100
2	UGDFIS202	Fire Risk Assessment	4	70	30	100
3	UGDFIS203	Construction Safety	4	70	30	100
4	UGDFIS204	Safety and Health	4	70	30	100
5	UGDFIS205	Practicum- II (Project Work)	4	70	30	100
<b>Total</b>			<b>20</b>	<b>350</b>	<b>150</b>	<b>500</b>

**Semester: I**  
**UG Diploma in Fire and Industrial Safety**

**Subject: Fundamentals of Fire Engineering Science** (52 Hours)

Sub Code: UGDFIS101	No. of Lecture Hours per week :04
Total Credit: 04	Internal Marks : 30 and Exam Marks : 70 = 100

**Unit I** **14 Hours**

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** **12 Hours**

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, Tetrahedron fire, Spread of fire,

**Unit III** **14 Hours**

OZONE, Understanding Ozone, troposphere, stratosphere, ozone in Earth's Atmosphere, impact of ozone depletion on plants, on organisms, on humans, MONTREAL PROTOCOL, to stop the depletion of ozone, KNPC Effort to protect ozone layer, TAKE TIME to work safety, effects of weather changes on safety.

**Unit IV** **12 Hours**

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

**Reference:**

- Fire Fighting and fire Safety; S.K Rathore, Sublime publication, Jaipur; India-2010
- Safety Management; R.K.Mishra, AITBS Publishers, New Delhi, India-2017
- Indian Buildings Congress, manual of Safety in Buildings; CPWD; A Nabhi Publication, New Delhi.2011
- Electrical Safety, fire safety Engineering and Safety management- S.Rao- R.K.Jain-Prof. H.L. Saluja. Kanna publishers Delhi-www.khannapublicshers.in – sec ed- 2012

**Subject: Fire Technology & Design**

(52 Hours)

Sub Code: UGDFIS102	No. of Lecture Hours per week :04
Total Credit: 04	Internal Marks : 30 and Exam Marks : 70 = 100

**Unit-I****14 Hours**

Classification of fire, Portable fire extinguishers, Introduction, Water fire extinguishers, Foam extinguishers, Dry powder and carbon Di-oxide Extinguishers, Halon Extinguishers, water type fire Extinguishers, soda Acid, Type fire Extinguishers, Gas pressure type water extinguishers, Constant Air pressure type water Extinguishers, maintenance of fire extinguishers,

**Unit-II****12 Hours**

Pumps and primers, Foam and foam making equipments, Hose, Types of Hose, Characteristics of Hose and Types of Hose fittings, Water relay systems, Open circuit relay systems, closed circuit relay system, arrangement of water relay systems, general tools and equipments,

**Unit-III****12 Hours**

breathing apparatus, respiratory cycle, types of BA/ CABA/FBA, instruction for using breathing apparatus, Fire protective clothing, choice of RIG, Approach Suit, proximity suit, entry suit, technical description of fire suites, and specification

**Unit-IV****14 Hours**

Ladders, types and general description of ladders, Rope, Ropes making materials, causes of deterioration of Ropes, Lines, Types of lines, bends & hitches, Fire prevention Special appliances, Fire fighting codes and standards, Electrical fire hazards, Structures under fire

**Reference:**

- Electrical Safety, fire safety Engineering and Safety management- S.Rao- R.K.Jain-Prof. H.L. Saluja. Kanna publishers Delhi-www.khannapublicshers.in – sec ed- 2012
- Fir Engineering Science & Technology- NIFE, kochi-wwwnifeindia.com. 2011.
- Principles of fire safety Engineering : Akilkumar Das, Educreation Publishing. 2012
- The Chemistry of powder and explosives by T.L davis, John wiley and Sons, New York. Sec Ed-2010
- OHSAS-18000 & 180001= Specification and guide lines.

**Subject: Industrial Safety**

(52 Hours)

Sub Code: UGDFIS103	No. of Lecture Hours per week :04
Total Credit: 04	Internal Marks : 30 and Exam Marks : 70 = 100

**Unit-I****14 Hours**

Fundamentals of industrial safety, importance of Safety in industry, causes of accidents and their preventive measures, types of accident, safety policy, safety committee and its activities, Different types of industries, Different types of safety systems and equipments, safety terminology,

**Unit-II****14 Hours**

Occupational Health and safety, meaning, health care services, quality of health services, occupational health services in places of employment, safety activities, suggestion for promoting occupational health and safety, difference between work related disease and occupational disease,

**Unit-III****12 Hours**

Work permit systems, types of work permit, precautions, Job safety analysis, job safety procedure, advantages of job safety analysis, Hazop study, Fault tree analysis, Emergency planning and its objectives, Safety inventory systems, Safety survey, Safety organization and duties of a safety officer.

**Unit-IV****12 Hours**

Stress- meaning, causes of stress, symptoms stress, handling stress, sources of stress and control measures, Accident prevention methods, Safety committee, Accident investigation, Safety management systems, Laws related to safety (Factories ACT 1948 Explosive ACT, Electricity ACT etc.)

**Reference:**

- Safety and Health in industry A Handbook- A M Sarma; Hyd.www.BS publication.net, BS Publication-2009
- Electrical Safety, fire safety Engineering and Safety management- S.Rao- R.K.Jain-Prof. H.L. Saluja. Kanna publishers Delhi-www.khannapublicshers.in – sec ed- 2012
- Industrial safety and first Aid - NIFE, kochi-wwwnifeindia.com. BS Publication hyd. 2009.
- industrial Safety, Health Environment and Security –Basudev Panda, University science press New delhi- 2011
- Industrial Safety and Environment-A.K.Gupta, An imprint of Laxmi Publication pvt. Ltd. New delhi- 2008.

**Subject: Environmental Safety**

(52 Hours)

Sub Code: UGDFIS104	No. of Lecture Hours per week :04
Total Credit: 04	Internal Marks : 30 and Exam Marks : 70 = 100

**Unit I****12 Hours**

Air pollutants – Pollution sources - automobile pollution-hazards of air pollution-concept of clean coal combustion technology, fly ash-control of combustion in combustion chambers- ultra violet radiation, infrared radiation, radiation from sun-hazards due to depletion of ozone – deforestation ozone holes-automobile exhausts-chemical factory stack emissions – CFC.

**Unit II****12 Hours**

Water pollutants-health hazards-sampling and analysis of water-water treatment - different industrial effluents and their treatment and disposal -advanced wastewater treatment - effluent quality standards and laws - chemical industries, tannery, textile effluents-common treatment.

**Unit III****14 Hours**

Hazardous waste management in India-waste identification, characterization and classification-technological options for collection, treatment and disposal of hazardous waste selection charts for the treatment of different hazardous wastes-methods of collection and disposal of solid wastes-health hazards-toxic and radioactive wastes incineration and verification - hazards due to bio-process-dilution-standards and restrictions – recycling and reuse.

**Unit IV****14 Hours**

Sampling and analysis – dust monitor – gas analyzer, particle size analyzer – lux meter-pH meter– gas chromatograph – atomic absorption spectrometer, Gravitational settling chambers-cyclone separators-scrubbers electrostatic precipitator - bag filter – maintenance - control of gaseous emission by adsorption, absorption and combustion methods- Pollution Control Board-laws, Pollution control in process industries like cement, paper, petroleum-petroleum products textile-tanneries-thermal power plants – dyeing and pigment industries – eco friendly energy

**Reference:**

- Industrial Safety, Health Environment and security; Basudev Panda; published by university schince press (an imprint of laxmi publication pvt. Ltd.,) New Delhi-02, 2011
- Safety Management System and Documentation Training Programme handbook; SV Paul, CBS Publishers & Distributors pvt. Ltd., New Delhi-02.- 2009
- Industrial safety and human behavior; H.L.Kaila, AITBS Publishers, India,2010



## **PRACTICUM–I**

### **(Field work)**

Total Credit: 04  
Code : UGDFIS105

Internal Marks : 30  
Viva Marks : 70

#### **RATIONALE FOR FIELD WORK:**

Theory provides the perspective and information base to understand the Fire and industrial Safety, challenges and issue contexts, within which human societies, engage and strive to create better living conditions. The classroom provides this theoretical knowledge and understanding which forms the foundation and core areas of Fire and industrial Safety. Field Work offers an environment within which students are given an opportunity to develop a coherent framework for practice by integrating and reinforcing the knowledge acquired in the classroom with actual practice. It also enables students to acquire and test relevant practice skills. Ongoing learning of practice is an opportunity to develop intervention skills in reality situations. This entails learning practice for **25 days of the semester**.

# Semester II

## UG Diploma in Fire and Industrial Safety

### Subject: Safety of People in the Event of Fire

(52 Hours)

Sub Code: UGDFIS201	No. of Lecture Hours per week :04
Total Credit: 04	Internal Marks : 30 and Exam Marks : 70 = 100

#### Unit-I

**14 Hours**

History of fires, Recognition of possible fire sources and emergency procedures in the event of a fire, fire investigation and the construction techniques for eliminating fires, types of detecting devices and extinguishing agents and systems, construction techniques, and fire investigation, National Fire Protection Association and Occupational Safety and Health Administration standards.

#### Unit-II

**12 Hours**

Devising procedures in the event of fire, How people perceive and react to fire danger, The measures needed to overcome behavioural problems and to ensure the safe evacuation of people in the event of fire, Assisting disabled people to escape

#### Unit-III

**12 Hours**

Safety goals and objectives, Monitoring safety progress, Identifying hazards and risks, Safety and financial benefits, Safety and the balanced scorecard, Setting targets and ensuring commitment, Developing safe work systems, Policies and procedures, Safety values and principles

#### Unit-IV

**14 Hours**

Allocating responsibility and authority, Rehabilitation after an incident, Workplace inspections, Measuring and reporting, Developing and effective safety culture, Building an incident free workplace, Removing obstacles to safety, Safety and accountability, Developing safety habits in the workplace, Fire Protection and Analysis

#### Reference

- Industrial Safety, Health Environment and security; Basudev Panda; published by university schince press (an imprint of laxmi publication pvt. Ltd.- 2011) New Delhi-02
- Safety Management System and Documentation Training Programme handbook; SV Paul, CBS Publishers & Distributors pvt. Ltd., New Delhi-02. - 2009
- Industrial safety and human behavior; H.L.Kaila, AITBS Publishers, India,2010

**Subject: Fire Risk Assessment**

(52 Hours)

Sub Code: UGDFIS202	No. of Lecture Hours per week :04
Total Credit: 04	Internal Marks : 30 and Exam Marks : 70 = 100

**Unit-I****14 Hours**

Introduction, Understanding fire: How and why people die in fires , Human behaviour in fire: How people behave in emergencies, Legislative requirements: The Regulatory Reform (Fire Safety) Order 2005, Fire hazards & risks, Plan Drawing, Brief look at drawing to scale, and how plans can be used to good effect

**Unit-II****14 Hours**

Fire risk assessment structure and layout, Means of escape principles: Basic requirements and what to look for, Fire signage: National requirements, Fire Alarms & fire detection: Basic components, and testing, Emergency lighting: When it is required, Basic components, and testing, Alternatives to emergency lighting

**Unit-III****12 Hours**

Emergency Plans & Staff Training, Highly Flammables & LPG, Firefighting equipment requirements, Fire resisting construction & compartmentation, Active fire safety for building protection: Sprinklers & Automatic roof vents

**Unit-IV****12 Hours**

The process of fire risk assessment, Fire risk assessment recording and review procedures, The potential for pollution arising from fires, Measures to prevent and reduce fire pollution, the Myths facts about safety belts, hunt for hazards at home

**Reference:**

- Industrial safety and human behavior; H.L.Kaila, AITBS Publishers, India, 2010
- Industrial Safety, Health Environment and security; Basudev Panda; published by university science press (an imprint of laxmi publication pvt. Ltd.- 2011) New Delhi-02
- Safety Management System and Documentation Training Programme handbook; SV Paul, CBS Publishers & Distributors pvt. Ltd., New Delhi-02.- 2009

**Subject: Construction Safety**

(52 Hours)

Sub Code: UGDFIS203	No. of Lecture Hours per week :04
Total Credit: 04	Internal Marks : 30 and Exam Marks : 70 = 100

**Unit-I****14 Hours**

Safety in construction, meaning, characteristics, Ten Principals of construction safety, safety measures during construction, construction Hazards, causes of accident and prevention of accident, checklist, accident report, the responsibility and basic gear of contractor, first aids.

**Unit-II****14 Hours**

Safety in scaffoldings – An overview, Types of Scaffolds, design, inspection, use, terminologies of scaffold, scaffold supervisor, foreman, components of scaffoldings, Investigation of scaffold accident, under the building other construction workers trenching and shoring Provisions on scaffold central rules, 1998, Safety in excavations,

**Unit-III****12 Hours**

Road work and pilling operation, Ladders, meaning, standers and materials for ladders, types of ladders, purpose of ladders, proper use of ladders, inspection and maintenance, Use of safety nets and fall protection systems, Concrete and concert foams and shoring

**Unit-IV****12 Hours**

Importance of civil work in construction industry, Material handling, important safety requirements and inspections, general safety facilities at construction sites, responsibility of field quality manager, safety check list and Personal Protective Equipments

**Reference:**

- Indian Buildings Congress, manual of Safety in Buildings; CPWD; A Nabhi Publication, New Delhi.- 2011
- Electrical Safety, fire safety Engineering and Safety management- S.Rao- R.K.Jain-Prof. H.L. Saluja. Kanna publishers Delhi-www.khannapublicshers.in – sec ed- 2012
- industrial Safety ,Health Environment and Security –Basudev Panda, (An imprint of Laxmi publication pvt. Ltd, 1<sup>st</sup> ed 2011)
- Industrial Safety and Environment-A.K.Gupta, (An imprint of Laxmi publication pvt. Ltd, 2<sup>nd</sup> 2008)

**Subject: Safety and Health**

(52 Hours)

Sub Code: UGDFIS204	No. of Lecture Hours per week :04
Total Credit: 04	Internal Marks : 30 and Exam Marks : 70 = 100

**Unit I****12 Hours**

Electrical Safety- Introduction, OSHA Standards on Electrical Safety, objectives of Safety and Security measures, types of electrical Hazards, primary and secondary electrical shocks, effects of electrical shocks on human body, approaches to prevent accident, and principals of electrical safety.

**Unit II****14 Hours**

Fist AID- Introduction, first principals of action After Electric Shock, Artificial Respiration, Schafer's Prone pressure method, silvester's method, Nielson's Arm-left Back pressure Method Mouth to Mouth Method, Use of Artificial resuscitator, External Cardiac Massage, Chocking, poisoning, open wounds, control of bleeding, burns and scalds, Fractures and Dislocations.

**Unit III****14 Hours**

Safety Management- Introduction, principals of safety management, definition, Safety policy, safety organization, training supervision, reports, motivation to managers and employees, Indian standards on safety, safety signals and posters, safety punishment and notices,

**Unit IV****12 Hours**

Occupational Health and Safety- introduction, definition, health care services, quality of Health service, promoting occupational health, occupational diseases, physical causes, chemical causes, biological causes, causes of Stress, Handling stress, sources of stress and control measures.

**Reference:**

- Industrial Safety, Health Environment and security; Basudev Panda; published by university schince press (an imprint of laxmi publication pvt. Ltd.,) New Delhi-02- 2011.
- Safety Management System and Documentation Training Programme handbook; SV Paul, CBS Publishers & Distributors Pvt. Ltd., New Delhi-02. -2009
- Industrial safety and human behavior; H.L.Kaila, AITBS Publishers, India,2010

## **PRACTICUM–II (Project Work)**

Total Credit:04  
Code UGDFIS205

Internal Marks : 30  
Viva Marks : 70

### **Objectives of the paper :**

1. To provide an opportunity for students to apply theoretical concepts in real life situations at the work place.
2. To enable students to manage resources, work under deadlines, identify and carry out specific goal oriented tasks.
3. To enable students discover their professional strengths and weaknesses and align them with the changing needs of environment.
4. To sharpen domain knowledge and provide cross functional skills.
5. To expose the students to the current safety issues.
6. To learn apply multidisciplinary concepts, tools and techniques to solve organizational problems.
7. To understand the processes involved in the working of the various functional industries.
8. To create awareness for various research topics in the safety.

### **PROJECT**

The candidate is expected to select a theme relevant to issues in consultation with the supervisor and make an exhaustive plan. Flexibility is accorded in planning and executing the Project. Creativity and analytical approach are the hallmarks of designing project. However, the activities are to be carried out under the direct supervision of the faculty supervisor. After completion of project work, students should submit his work in the form dissertation.

**Question Paper Pattern**  
**for UG Diploma in Fire and Industrial Safety Examination**

Paper Code :

Paper Title:

Time : 3 Hours

Max Marks : 70

Section – A

Answer any **Five** questions

(5x2=10)

Q1.

Q2.

Q3.

Q4.

Q5.

Q6.

Section –B

Answer any **three** of the following questions

(3x10=30)

Q7.

Q8.

Q9.

Q10.

Q11.

Section –C

Answer any **Two** of the following questions

(2x15=30)

Q12.

Q13.

Q14.

Note for paper Setter: Question paper shall be set in English Version only