

Chhattisgarh Sami Vivekanand Technical University, Bhilai

Diploma in Industrial Safety & Fire Safety Engineering

Semester -VI

- A) Course Code : 2129671(020)
B) Course Title : Safety in Petrochemical Industry
C) Pre- requisite Course Code and Title :
D) Rationale :

Petrochemical industry is one of the core industry sector where industrial safety and fire safety is of utmost importance, the industry mainly include petrochemical refineries, bottling plants, gas terminal etc. (major companies of these sector such as ONGC, IOCL, British Petroleum etc.). Fire catastrophe is a major concern in these areas hence as a student of industrial and fire safety it is mandatory to know about the various chemical fuels and product related to these sectors of Petrochemical industry, to know about the processes carried therein. It is also very crucial to know about the hazards, firefighting measures, protection system, design, emergency planning and legal compliances (such OISD norm, explosive act, petroleum act etc.) relating to the before mentioned aspects exclusive to the Petrochemical industry.

E) Course Outcomes:

The students after going through the course will know about:

CO-1: Know about the properties & characteristics of chemicals used in petrochemical industry.

CO-2: Basics of the refineries process and layout of a typical refinery.

CO-3: Fire protection systems in Petrochemical industry.

CO-4: Firefighting in various Petrochemical industry facilities.

CO-5: Statutory provisions pertaining to refineries, petrochemical plants.

F) Scheme of Studies:

Board of Study	Course Code	Course Titles	Scheme of Studies (Hours/Week)			Credits L+T+(P/2)
			L	P	T	
Civil Engineering	2129671(020)	Safety in Petrochemical Industry	3	-	1	4

L- Lecture,

T- Tutorial,

P- Practical,

Legend: Lecture (L) → CI: Classroom Instruction (Includes different instructional strategies i.e. Lecture and others).

Practical (P) → LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies).

Tutorial (T) → SL: Self Learning.

G) Scheme of Assessment:

Board of Study	Course Code	Course Titles	Scheme of Examination					
			Theory			Practical		Total
			ESE	CT	TA	ESE	TA	Marks
Civil Engineering		Safety in Petrochemical Industry	70	20	30	-	-	120

ESE: End Semester Exam,

CT: Class Test,

TA: Teachers Assessment

Legend- PRA: Process Assessment, PDA: Product Assessment

Note:

- TA in Theory includes Sessional work (SW) and attendance (ATT) with weightage of 70% and 30% of total respectively.
- TA in practical includes performance of PRA, PDA and Viva-Voce with weightage of 50%, 40% and 10% respectively.
- 85% attendance is essential in theory and practical classes to appear in Examination.

H) Course-Curriculum Detailing:

This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW) and Self Learning (SL). Students are expected to demonstrate the attainment of Session Outcomes (SOs) and finally Course Outcomes (COs) upon the completion of course. Convert unit of the given physical quantity from one unit system to other.

CO-1: Know about the properties & Characteristics of chemicals used in Petrochemical industry.

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
SO1.1 Understanding the backbone of the Petrochemical industry i.e. crude oil. SO1.2 To Learn Classification of petroleum & its products. SO1.3 To know MSDS of chemicals related to Petrochemical industry, to give deep understanding of hazards of these chemicals and their remedies.	--	UNIT-1.0 Chemicals of Petrochemical Industry. 1.1 Crude oil, its properties & Characteristics . 1.2 Classification of petroleum & its products. 1.3 MSDS of crude oil, diesel, gasoline. 1.4 MSDS kerosene, LPG, Natural Gas, nylon, Naphtha, Ammonia, Benzene, toluene, Acetylene.	SL1.1 Collect information on Indian scenario of crude oil. SL1.2 Prepare MSDS of any two common chemicals of fertilizer industry.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

1. Explain in detail the importance of MSDS with the help of an example?
2. What is the importance of crude oil in Petrochemical industry?
3. How classification of petroleum and its product is useful for industrial safety personnel?

b. Mini Project:

1. Collect 4 MSDS prepared by different companies?
2. Prepare a presentation on a offshore drilling accident?

CO-2 : Basics of the refineries process and layout of a typical refinery.

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
SO2.1 To learn about massive storage of fuel & layout of a typical refinery. SO2.2 To learn about basic refinery processes. SO2.3 To know about common units of petrochemical plant.	--	Unit 2.0 Petrochemical refinery processes and layout. 2.1 Storage tank and its types. 2.2 Basic layout and flow diagram of a typical refinery. 2.3 Refinery processes : distillation, cracking and its types, desalting, polymerisation, sulphur recovery etc. 2.4 Refinery units such as ADU, VDU, Desalter, catalytic reformer, heat exchanger etc.	SL2.1 Collect information on tank farms of a refinery. SL2.2 collect Information about distillation tower.

SW-2 Suggested Sessional Work (SW):

a. Assignments

1. What are the different types of storage units in a petrochemical plant?
2. Define following Terms in relation to a petrochemical plant:
(1) Distillation (2) Heat exchanger
3. Illustrate in detail layout of a refinery.

b. Mini Project:

1. Prepare a presentation on the layout of a refinery, highlighting the safety aspects in it.

CO-3: Fire protection systems in Petrochemical industry.

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
SO3.1 Understanding fire hazards and fire water network in petrochemical plant. SO3.2. To learn Fire fighting installations in petrochemical plant. SO3.3 To know about Tank area/farm safety measures in petrochemical plant.	--	UNIT-3.0: Fire protection systems. 3.1 Major fire hazards. 3.2 Fire water network for petroleum industry. 3.3 Fire fighting installations such as hydrant, foam pourers etc. 3.4 Subsurface injection Fixed DCP, & steam snuffing systems. 3.5. Storage tanks area safety measures.	SL3.1 Collect data on fire accidents in Indian refineries. SL3.2 Learn what is the difference between fire protection system in a building and that in a petrochemical plant.

SW-3 Suggested Sessional Work (SW):

a. Assignments:

1. List out the source of major fire hazards in a industry?
2. Explain foam pourers& subsurface injection systems of fire protection?
3. Discuss about fire water network system in petrochemical plant?

b. Mini Project:

1. Prepare a presentation on Fire protection systems in petrochemical plant as per OISD?

CO-4: Firefighting in various Petrochemical industry facilities.

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class Room Instruction (CI)	Self Learning (SL)
SO4.1 To Learn precautionary measures in case of non-ignited releases, oil & gas leaks. SO4.2 Firefighting facilities for depots, terminals etc. SO4.3 To Learn Firefighting & procedures in case of BLEVE, LPG hazards, spillage. SO4.4 Firefighting facilities at LPG bottling plants.	--	UNIT-4.0 Firefighting in various Petrochemical industry facilities. 4.1 Precautionary measures in case of non-ignited releases, oil & gas leaks. 4.2 Firefighting facilities for depots, terminals, drilling platforms, and pipelines for transportation of petroleum products & Gas. 4.3 Firefighting & procedures in case of BLEVE, LPG hazards, spillage. 4.4 Firefighting facilities at LPG bottling plants. Water Injection into LPG vessel (water bottoming)	SL4.1 Find an accident in India of BLEVE. SL4.2 Prepare a list of gas terminals and bottling plant in your home state/district.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

1. What are the Precautionary measures in case of non-ignited releases, oil & gas leaks.
2. Explain the “BLEVE” phenomenon in detail?
3. Firefighting facilities at LPG bottling plants?

b. Mini Project:

1. Prepare a presentation on Firefighting facilities at LPG bottling plants.

CO-5: To know about Legal provisions related to petrochemical industry.

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class Room Instruction (CI)	Self Learning (SL)
SO5.1 To be well versed with the various OISD norms essential to fire safety of petrochemical industry. SO5.2 To be well versed with Petroleum Act & Rules, PNGRB draft essential for legal compliances & high safety standards in industry. SO5.3 To be well versed with Explosive Act Explosive Rules and Gas cylinders Rules.	--	UNIT-5.0 Legal provisions related to petrochemical industry. 5.1 Oil Industry Safety Directorate (OISD) such as 116,117 etc. 5.2 Petroleum Act 1934, Petroleum Rules. 5.3 Natural Gas Regulatory Board (PNGRB) drafts (latest amended versions). 5.4 Explosive Act 1884, Explosive Rules. 5.5 Gas cylinders Rules NOTE: All rules and provisions shall be of latest versions.	SL5.1 Find out about the History of OISD. SL5.2 Find how did PNGRB came in to existence.

SW-5 Suggested Sessional Work (SW) :

a. Assignments:

1. Give detailed account of petroleum act?
2. Give detailed account of OISD 116 in relation to firefighting installations in various facilities?
3. Outline important features related to fire safety as per explosive rules?

b. Mini Project:

1. Prepare a project on real accident case where the provisions of act/rules in syllabus were contravened.

Legend: CI: Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others), LI: Laboratory Instruction (Includes Practical performances in Laboratory, Workshop, field or other locations using different instructional strategies) SL: Self Learning.

Note: Performance under Laboratory and Sessional work may appear in more than one COs/SOs.

H) Suggested Specification Table (For ESE of Classroom Instruction CI+SW+SL):

Unit Number	Unit Title	Marks Distribution			Total Marks
		R	U	A	
I	Chemicals of Petrochemical Industry	4	6	4	14
II	petrochemical refinery processes and layout	4	6	4	14
III	Fire protection systems	4	6	4	14
IV	Firefighting in various Petrochemical industry facilities.	4	6	4	14
V	Legal provisions related to petrochemical industry.	4	6	4	14
Total		20	30	20	70

I) Suggested Specification Table (For ESE of Laboratory Instruction*): Nil

Laboratory Instruction Number	Short Laboratory Experiment Title	Assessment of Laboratory Work (Marks)		
		Performance		Viva-Voce
		PRA	PDA	
-	-	-	-	-

*Assessment rubric, process and product check list with rating scale need to be prepared by the course wise teachers for each experiment for conduction and assessment of laboratory experiments /practicals.

Note : Only one experiment has to performed at the end semester examination of 40 Marks as per assessment scheme.

J) Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Industrial visits
4. Industrial Training
5. Demonstration
6. Others

K) Suggested Learning Resources:

(a) Books :

S.No.	Title	Author	Publisher	Edition & Year
1	Fire Service Manual (Volume 2) Fire Service Operations - Petrochemical Incidents	Fire and emergency planning directorate, London.	H M Fire service inspectorate publication	2000
2	OISD Standards norms and rules 115,116,117,118	--	Government published	
3	Explosive Act 1884, Explosive Rules 1983 and Gas cylinders Rules 2004. Note: The latest versions	--	Government published	
4	Petroleum & Natural Gas Regulatory Board (PNGRB) drafts	--	Government published	
5	Loss prevention in Process of Industries, Vol 1, 2, & 3.	Frank P. Lees.	Elsevier sciences	2012

b) Open source software and website address:

- i. <https://www.bis.gov.in/>
- ii. <https://www.oisd.gov.in/>
- iii. <https://dgfscdhg.gov.in/national-building-code-india-fire-and-life-safety>
- iv. <https://www.osha.gov/personal-protective-equipment>
- v. <https://www.pngrb.gov.in/>
- vi. <https://www.hse.gov.uk/comah/sragtech/techmeasfire.htm>

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L) Mapping of POs & PSOs with COs:

Course Outcomes (COs) Titles	Programme Outcomes(POs)										Programme Specific Outcomes(PSOs)	
	Basic knowledge PO-1	Discipline knowledge PO-2	Experiments & Practice PO-3	Engineering Tools PO-4	The Engineer & Society PO-5	Environment & Sustainability PO-6	Ethics PO-7	Individual & Team work PO-8	Communication PO-9	Life Long learning PO-10	PSO-1	PSO-2
CO-1: Know about the properties & characteristics of chemicals used in petrochemical industry.	2	3	0	2	2	0	0	2	0	1	2	1
CO-2: Basics of the refineries process and layout of a typical refinery.	2	2	0	2	2	0	0	1	0	2	2	1
CO-3: Fire protection systems in Petrochemical industry.	2	2	0	2	2	0	0	1	0	2	2	1
CO-4: Firefighting in various Petrochemical industry facilities.	2	2	0	2	2	0	1	1	0	2	2	2
CO-5: Statutory provisions pertaining to refineries, petrochemical plants.	2	2	0	2	2	1	0	1	0	2	2	1

Legend: 1 – Low, 2 – Medium, 3 – High

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K) Course Curriculum Map:

POs & PSOs No.	COs No.& Title	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self Learning(SL)
PO-1,2,3,4,5,8,10 PSO-1,2	CO-1: Know about the properties & characteristics of chemicals used in petrochemical industry.	SO1.1 SO1.2 SO1.3	--	1.1 1.2 1.3 1.4	SL1.1 SL1.2
PO-1,2,3,4,5,8,10 PSO-1,2	CO-2: Basics of the refineries process and layout of a typical refinery.	SO2.1 SO2.2 SO2.3	--	2.1 2.2 2.3 2.4	SL2.1 SL2.2
PO-1,2,3,4,5,8,10 PSO-1,2	CO-3: Fire protection systems in Petrochemical industry.	SO3.1 SO3.2 SO3.3	--	3.1 3.2 3.3 3.4 3.5	SL3.1 SL3.2
PO-1,2,3,4,5,8,10 PSO-1,2	CO-4: Firefighting in various Petrochemical industry facilities.	SO4.1 SO4.2 SO4.3 SO4.4	--	4.1, 4.2 4.3, 4.4	SL4.1 SL4.2
PO-1,2,3,4,5,8,10 PSO-1,2	CO-5: Statutory provisions pertaining to refineries, petrochemical plants.	SO5.1 SO5.2 SO5.3	--	5.1 5.2 5.3 5.4 5.5	SL5.1 SL5.2

Legend: CI: Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others), LI: Laboratory Instruction (Includes Practical performances in Laboratory, Workshop, field or other locations using different instructional strategies) SL: Self Learning.

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- A) Course Code : 2129672(020)
B) Course Title : Nuclear Safety and Radioactive Materials
C) Pre- requisite Course Code and Title :
D) Rationale :

Radioactive material presents an exclusive hazard of the highest grade i.e., radiation exposure its severity of damage, long term effects and intergenerational effects on biological beings puts it on the top of hazardous material palette. Places which are most common for this are nuclear power plant, research facility and labs. Industrial safety students must be aware about various radioactive hazard sources, about monitoring radiation for safe entrance and exposure time evaluation. Basics of nuclear power plant its functioning and design are also mandatory. Students shall also be aware about radioactive waste and its safe disposal. Precautionary measures for personnel radiation safety, PPEs for radiation safety, emergency procedures in nuclear power plants are the aspects to which the students should know about.

E) Course Outcomes:

CO-1: Student will learn about radioactivity fundamentals and radiation monitoring.

CO-2: Student will have a fundamental understanding about nuclear power plants working, design and safety measures therein.

CO-3: Student will learn about radioactive waste and various aspects related to it.

CO-4: Student will know about radiation release, its spread/diffusion, effect on biological beings.

CO-5: Student will learn about the history of nuclear accidents and hence what should not be repeated as a mistake, what to expect and how to respond in case of a nuclear accident.

F) Scheme of Studies:

Board of Study	Course Code	Course Titles	Scheme of Studies (Hours/Week)			Credits L+T+(P/2)
			L	P	T	
Civil Engineering	2129672(020)	Nuclear Safety and Radioactive Materials	2	-	1	3

L- Lecture,

T- Tutorial,

P- Practical,

Legend: Lecture (L) → CI: Classroom Instruction (Includes different instructional strategies i.e. Lecture and others).

Practical (P) → LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies).

Tutorial (T) → SL: Self Learning.

A) Scheme of Assessment:

Board of Study	Course Code	Course Titles	Scheme of Examination					
			Theory			Practical		Total
			ESE	CT	TA	ESE	TA	Marks
Civil Engineering	2129672(020)	Nuclear Safety and Radioactive Materials	70	20	30	-	-	120

ESE: End Semester Exam,

CT: Class Test,

TA: Teachers Assessment

Legend- PRA: Process Assessment, PDA: Product Assessment

Note:

- TA in Theory includes Sessional work (SW) and attendance (ATT) with weightage of 70% and 30% of total respectively.
- TA in practical includes performance of PRA, PDA and Viva-Voce with weightage of 50%, 40% and 10% respectively.
- 85% attendance is essential in theory and practical classes to appear in Examination.

H) Course-Curriculum Detailing:

This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW) and Self Learning (SL). Students are expected to demonstrate the attainment of Session Outcomes (SOs) and finally Course Outcomes (COs) upon the completion of course. Convert unit of the given physical quantity from one unit system to other.

CO-1: Student will learn about hazard, risk issues and hazard assessment.

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
SO1.1 To know about Fundamentals of radioactivity, Types of radiation & various radioactive material. SO1.2 To learn in detail about radiation monitoring and its importance to nuclear safety. SO1.3 To be aware about Radiation exposure doses, safe and unsafe ranges of it.	--	UNIT-1.0 Fundamentals of radioactivity & radiation monitoring. 1.1 Introduction, to radioactivity and radioactivity terms. 1.2 Types of radiation & radioactive material. 1.3 Radiation monitoring & its importance in nuclear safety. 1.4 Types of radiation monitoring in safety and equipment used in monitoring. 1.5 Radioactive doses, Permissible limits of radioactive doses.	SL1.1 Collect data on a facilities which deals with radioactive material in your district/state. SL1.2 Collect data about radiation exposure on people in Indian context.

SW-1 Suggested Sessional Work (SW):**a. Assignments:**

- Explain about alpha, beta and gamma radiation?.
- Define what dosimetry and what are the significance of various reading ranges of it.
- Explain G M instruments, ionization instruments & Scintillation instruments used survey meters?

b. Mini Project:

- Prepare a presentation on uniqueness of radiation hazard as compared to other industrial hazards.

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CO-2: Student will have a fundamental understanding about nuclear power plants working, design and safety measures therein.

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
<p>SO2.1 Understand the functioning and design of a Nuclear Power Plant.</p> <p>SO2.2 To learn about nuclear reactors and Safety Features in each Reactor.</p> <p>SO2.3 To learn about LOCA typical sequence PPEs and medical responses in for nuclear radiation.</p>	--	<p>UNIT 2.0 Nuclear power plant and its safety:</p> <p>2.1 Basics of functioning and design of a Nuclear Power Plant.</p> <p>2.2 Overview and brief description of nuclear reactors such :PWR, BWR, PHWR OR CANDU.</p> <p>2.3 Engineered Safety Features in each Reactors.</p> <p>2.4 LOCA typical sequence in Nuclear Power Plant.</p> <p>2.5 PPEs and medical responses for nuclear radiation.</p>	<p>SL2.1 Collect information regarding Indian nuclear power plant and a the reactors in them.</p> <p>SL2.2 To find about real life scenarios of LOCA sequence.</p>

SW-2 Suggested Sessional Work (SW):

a. Assignments:

1. Describe an overview of nuclear power plant design and functioning?
2. Outline safety features present in nuclear reactors.
3. What is a LOCA sequence?
4. Give detailed account of PPEs used in a nuclear facility?

b. Mini Project: Prepare presentation on emergency preparedness plan of a nuclear power plant.

CO-3: Student will learn about radioactive waste and various aspects related to it.

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
<p>SO3.1 To have a understanding about sources of radioactive waste their type and classification.</p> <p>SO3.2 To learn about Precautions to be taken while handling radioactive waste & methods of disposing radioactive waste.</p> <p>SO3.3 To be familiar with regulatory agencies related to atomic energy and their guidelines.</p>	--	<p>Unit-3.0 Radioactive waste:</p> <p>3.1 Various sources and industries of radioactive waste.</p> <p>3.2 Various types and characteristics of radioactivewaste.</p> <p>3.3 Precautions to be taken while handling radioactive waste.</p> <p>3.4 Methods of disposing radioactive waste.</p> <p>3.5 Overview of standard related to radioactive waste such as AERB & IAEA.</p>	<p>SL3.1 To find out about Indian scenario of radioactive waste handling.</p>

SW-3 Suggested Sessional Work (SW):

a. Assignments:

1. Outline the primary sources of radioactive waste.
2. What are the different methods of disposing radioactive waste.
3. What are the guidelines of AERA & IAEA in regards to maintaining and disposing radioactive waste?
4. What precautionary measure shall be taken in relation to radioactive waste disposal?

b. Mini Project: Prepare a presentation on current global situation of radioactive waste disposal challenges.

CO-4: Student will know about radiation release, its spread/diffusion, effect on biological beings.

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
SO4.1 To learn about scenarios of radiation release. SO4.2 To learn about Absorption of radiation in plant human animal & other biological entities. SO4.3 To have understanding of On-site and Off-site response to a Radiation release.	--	Unit-4.0 Radiation release/dispersion: 4.1 Different scenarios of radiation release/leak/dispersion. 4.2 Dispersion/diffusion of radiation at different height/temperature, through air, water etc. 4.3 Absorption of radiation in plant human animal & other biological entities. 4.4 Special case of radioactive iodine release. 4.5 On site and off site response to a Radiation release.	SL4.1 Find information related to dispersion stages of radiation in case of a nuclear power plant leak SL4.2 To find data related to radiation effects on human animals in real life accidents I the past.

SW-4 Suggested Sessional Work (SW) :

a. Assignments:

1. What are the different ways in which Radiation leak may happen?
2. Explain in detail about Onsite and Offsite response to a Radiation release.
3. How radiation does gets absorbed in biological being and what are the effects of it?

b. Mini Project: Prepare a report on Emergency preparedness plan based on a Indian nuclear power plant.

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CO-5: Student will learn about the history of nuclear accidents and hence what should not be repeated as a mistake, what to expect and how to respond in case of a nuclear accident.

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
SO5.1 will know about importance and significance of case studies in the field of industrial safety using past accident as learning ground. SO5.2 will be aware of the most catastrophic nuclear havocs in human history such as Chernobyl fukushima and other such disasters.	--	Unit-5 Case studies of major nuclear accidents: 5.1 Importance of case studies learning, Causes and sequence of events, Consequences & follow up actions. 5.2 Three Mile Island unit-2 Accident. 5.3 Chernobyl Accident. 5.4 Fukushima Station Accident. 5.5 Davis Basse Accident.	SL5.1 Find out the locations in Indian where a massive nuclear accident may occur. SL5.2 Find out about such Indian facilities other than nuclear power plant where a potential of radiation mishap may occur.

SW-5 Suggested Sessional Work (SW) :

a. Assignment:

1. Give detailed account on Chernobyl nuclear disaster
2. Explain how a case study should be prepared and used for learning from past experience.
3. Give highlight on fukushima disaster and how did the Japanese government took lessons from it.

b. Mini Project: Prepare a case study on an Indian nuclear accident.

Legend: CI: Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others), LI: Laboratory Instruction (Includes Practical performances in Laboratory, Workshop, field or other locations using different instructional strategies) SL: Self Learning.

Note: Performance under Laboratory and Sessional work may appear in more than one COs/SOs.

I) Suggested Specification Table (For ESE of Classroom Instruction CI+SW+SL):

Unit Number	Unit Title	Marks Distribution			Total Marks
		R	U	A	
I	FUNDAMENTALS OF RADIOACTIVITY & RADIATION MONITORING.	4	6	4	14
II	NUCLEAR POWER PLANT AND IT'S SAFETY.	4	6	4	14
III	RADIOACTIVE WASTE.	4	6	4	14
IV	RADIATION RELEASE/DISPERSION.	4	6	4	14
V	CASE STUDIES OF MAJOR NUCLEAR ACCIDENTS	4	6	4	14
Total		20	30	20	70

Legend: R: Remember, U: Understand, A: Apply and above

J) Suggested Specification Table (For ESE of Laboratory Instruction*): Nil

Laboratory Instruction Number	Short Laboratory Experiment Title	Assessment of Laboratory Work (Marks)		
		Performance		Viva-Voce
		PRA	PDA	
-	-	-	-	-

* Assessment rubric, process and product check list with rating scale need to be prepared by the course wiseteachers for each experiment for conduction and assessment of laboratory experiments /practicals.

Legend : PRA: Process Assessment, PDA : Product Assessment

Note : Only one experiment has to performed at the end semester examination of 40 Marks as per assessmentscheme.

(K) Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Video lectures
4. Demonstration
5. Others

L) Suggested Learning Resources:

(a) Books :

S.No.	Title	Author	Publisher	Edition & Year
1	PERSONNEL MONITORING OF RADIATION WORKERS IN RADIATION FACILITIES by AERB (Atomic Energy Regulatory Board)		AERB (Atomic Energy Regulatory Board)	2020
2	International atomic energy agency general safety guides GS-G-2.1 STI/PUB/1265, GSG-1 STI/PUB/1419, No. GSG-7 STI/PUB/1785, SSG-74 STI/PUB/2028, General Safety Requirements No. GSR Part 5		International atomic energy agency	As per the general safety guide
3	Nuclear Safety	Gianni Petrangeli,	Elsevier	2006
4	Hazardous Materials Handbook For Emergency Response	Joe Varela,	, International Thomson Publishing.	2015

b) Open source software and website address:

1. <https://www.osha.gov/>
2. <https://www.csb.gov/>
3. [https:// www.aerb.gov.in/english/publications/codes-guides](https://www.aerb.gov.in/english/publications/codes-guides)
4. [https:// https://www.iaea.org/resources/safety-standards](https://www.iaea.org/resources/safety-standards)

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N) Mapping of POs & PSOs with COs:

Course Outcomes (COs) Titles	Programme Outcomes (POs)										Programme Specific Outcomes (PSOs)	
	Basic knowledge PO-1	Discipline knowledge PO-2	Experiments & Practice PO-3	Engineering Tools PO-4	The Engineer & Society PO-5	Environment & Sustainability PO-6	Ethics PO-7	Individual & Team work PO-8	Communication PO-9	Life Long learning PO-10	PSO -1	PSO -2
CO-1: Student will learn about radioactivity fundamentals and radiation monitoring	2	3	2	2	2	0	0	2	0	1	2	1
CO-2: Student will have a fundamental understanding about nuclear power plants working, design and safety measures therein.	2	2	3	2	2	0	0	1	0	2	2	1
CO-3: Student will learn about radioactive waste and various aspects related to it.	2	2	3	2	2	0	0	1	0	2	2	1
CO-4: Student will know about radiation release, its spread/diffusion, effect on biological beings.	2	2	3	2	2	0	0	1	0	2	2	2
CO-5: Student will learn about the history of nuclear accidents and hence what should not be repeated as a mistake, what to expect and how to respond in case of a nuclear accident.	2	2	3	2	2	0	0	1	0	2	2	1

Legend: 1 – Low, 2 – Medium, 3 – High

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O) Course Curriculum Map:

POs & PSOs No.	COs No.& Title	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self Learning (SL)
PO-1,2,3,4,5,8,10 PSO-1,2	CO-1: Student will learn about radioactivity fundamentals and radiation monitoring	SO1.1 SO1.2 SO1.3	-	1.1 1.2 1.3 1.4 1.5	SL1.1 SL1.2
PO-1,2,3,4,5,8,10 PSO-1,2	CO-2: Student will have a fundamental understanding about nuclear power plants working, design and safety measures therein.	SO2.1 SL2.2 SL2.3	-	2.1 2.2 2.3 2.4 2.5	SL2.1 SL2.2
PO-1,2,3,4,5,8,10 PSO-1,2	CO-3: Student will learn about radioactive waste and various aspects related to it.	SO3.1 SO3.2 SO3.3	-	3.1 3.2 3.3 3.4 3.5	SL3.1
PO-1,2,3,4,5,8,10 PSO-1,2	CO-4: Student will know about radiation release, its spread/diffusion, effect on biological beings.	SO4.1 SO4.2 SO4.3	-	4.1 4.2 4.3 4.4 4.5	SL4.1 SL4.2
PO-1,2,3,4,5,8,10	CO-5: Student will learn about the history of nuclear accidents and hence what should not be repeated as a mistake, what to expect and how to respond in case of a nuclear accident.	SO5.1 SO5.2	-	5.1 5.2 5.3 5.4 5.5	SL5.1 SL5.2

Legend: CI: Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others), LI: Laboratory Instruction (Includes Practical performances in Laboratory, Workshop, field or other locations using different instructional strategies) SL: Self Learning.

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- A) Course Code : 2129673(020)
 B) Course Title : Special Fire Hazards(Aviation, Marine & High-Rise Building)
 C) Pre- requisite Course Code and Title :
 D) Rationale :

This subject include special location of hazard in aviation and marine industry, constructional features of aircraft and marine vessel , activities carried out in these locations so as to develop familiarity with these industry to understand various emergency and accident to which these industries are prone to. To learn about firefighting equipment's and system which are best suited for these locations.

E) Course Outcomes:

CO-1: Students will have fundamental understanding constructional features of an aircraft, emergency landings and procedures.

CO-2: Students will learn about aircraft and hangers and associated hazards.

CO-3: Students will learn about fundamentals of marine industry.

CO-4: Students will learn about associated hazards, fire scenarios, & respective emergency procedures.

CO-5: Students will learn about fire safe buildings design.

A) Scheme of Studies:

Board of Study	Course Code	Course Titles	Scheme of Studies (Hours/Week)			Credits L+T+(P/2)
			L	P	T	
Civil Engineering	2129673 (020)	Special Fire Hazards (Aviation, Marine & High-Rise Building)	2	-	1	3

L- Lecture,

T- Tutorial,

P- Practical,

Legend: Lecture (L) → CI: Classroom Instruction (Includes different instructional strategies i.e. Lecture and others).

Practical (P) → LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies).

Tutorial (T) → SL: Self Learning.

B) Scheme of Examination:

Board of Study	Course Code	Course Titles	Scheme of Examination					
			Theory			Practical		Total
			ESE	CT	TA	ESE	TA	Marks
Civil Engineering	2129673 (020)	Special Fire Hazards (Aviation, Marine & High-Rise Building)	70	20	30	-	-	120

ESE: End Semester Exam,

CT: Class Test,

TA: Teachers Assessment

Legend- PRA: Process Assessment, PDA: Product Assessment

Note:

- TA in Theory includes Sessional work (SW) and attendance (ATT) with weightage of 70% and 30% of total respectively.
- TA in practical includes performance of PRA, PDA and Viva-Voce with weightage of 50%,40% and 10% respectively.
- 85% attendance is essential in theory and practical classes to appear in Examination.

H) Course-Curriculum Detailing:

This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW) and Self Learning (SL). Students are expected to demonstrate the attainment of Session Outcomes (SOs) and finally Course Outcomes (COs) upon the completion of course. Convert unit of the given physical quantity from one unit system to

CO-1: Students will have fundamental understanding constructional features of an aircraft, emergency landings and procedures.

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
SO1.1 Understand the Constructional features of an Air Craft, Basic Fire-Hazards in Aircraft, Nature of Air Crashes. SO1.2 Understanding the rescue related operations in aircrafts. SO1.3 Types of Safety Belts, Ejection-Seats; and their methods of release.	--	UNIT-1.0 Constructional feature of Aircraft and related emergencies. 1.1 Constructional features of an Air Craft, Types of Engines 1.2 Basic Fire-Hazards in Aircraft, Nature of Air Crashes. 1.3 Emergency Landings including belly leading. 1.4 Access to Fire Service Personnel and Escape of trapped persons problems. 1.5 Types of Safety Belts, Ejection-Seats; and their methods of release. 1.5 Rescue and Fires in Air Craft and methods of fire-fighting.	SL1.1 find data on Indian crash landing of aircrafts and their root causes SL1.2 Learn about locations on different aircraft for forced entry in a rescue operation.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

1. Explain the Constructional features of an Air Craft, Types of Engines.
2. Explain Types of Safety Belts, Ejection-Seats, and their methods of release.
3. Define Chloro Fluoro Carbon (CFC).

b. Mini Project:

1. Prepare a report on Safety guidelines by DGCA.

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CO-2: Students will learn about aircraft and hangers and associated hazards.

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
SO2.1 To know about types of hangers associated hazards, Refueling and Defiling in Air Cargo. SO2.2 To learn about firefighting appliances in aircraft hangers.	--	UNIT 2.0 Airport and hangers. 2.1 Hazards in Airport, Protection & Types of Hangers. 2.2 Refuelling and Defiling in Air Cargo. 2.3 Provision of Crash, Fire Tenders including Rapid Intervening appliances. 2.4 Categorization of Air- Port as per DGCA. 2.5 Extinguishing media and determination of the appliances for each category.	SL2.1 Learning About categories of airport as per DGCA. SL2.2 Finding out the SOP for fuelling and defueling of air cargo.

SW-2 Suggested Sessional Work (SW):

a. Assignments

1. Discuss Hazards in Airport, Protection & Types of Hangers.?
2. Explain forced entry procedures in case of aircrafts for rescue?
3. Describe Categorization of Air- Port as per DGCA.

b. Mini Project:

4. Prepare a case study on a aircraft accident in India.

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CO-3: Students will learn about fundamentals of marine industry.

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
SO3.1 To be aware of maritime, terminology environment, organizational role, vessel types & their constructional features. SO3.2 To learn about Cargo vessels and their loading and unloading at docks. SO3.3 Understand cargo vessel their types hazards & their safety.	--	UNIT-3.0 Fundamentals of marine industry: 3.1 Terminology used at sea vessels. 3.2 The maritime environment, organizational role. 3.3 Vessel types & their constructional features. 3.4 Cargo vessel their types hazards & their safety.	SL3.1 Learning cargo vessel their types in global scenario. SL3.2 Finding data on maritime cargo fires in Indian context.

SW-3 Suggested Sessional Work (SW):

a. Assignments:

1. Explain the environmental conditions to which maritime personnel are exposed to.
2. Explain the different vessel types & their constructional features.
3. Explain Systems of fire detection & suppression systems.

b. Mini Project:

1. Prepare a report on a real life maritime fire accident.

CO-4: Students will learn about associated hazards, fire scenarios, & respective emergency procedures.

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
SO4.1 Learning about fire safety presents onboard various sea vessels. SO4.2 To learn about rescue operations at sea vessels, training and tactical planning of such measures.	--	UNIT- 4.0 Marine fire and safety. 4.1 Systems of fire detection & suppression systems in sea vessels. 4.2 Cargo vessel hazards & safety. 4.3 Marine fire- vessel fire incidents, Marine incidents. 4.4 Incident strategies & tactics training & planning, Rescue operations.	SL4.1 Learn about the agency that governs the safety norms related to marine industry. SL4.2 Learning about authorities that grant clearances/NOC for fire safety measures in a sea vessels.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

1. Explain the most relevant and apt fire suppression system for sea vessels.
2. What precautionary measures must be followed on a cargo loading and unloading dock yard?
3. What measures shall be present on a vessel for emergency evacuation in case of a marine fire.

b. Mini Project:

1. Prepare a presentation on Indian safety guidelines according to concerned agency/authority for marine vessels.

CO-5: Students will learn about fire safe building design.

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
SO5.1 Learning safe building design features from the aspects of smoke movement exit capacity, location of fire exits, occupant load etc	--	UNIT-5 Safe building design for high rise building: Fundamentals of Fire Safe Building design, Life safety systems for high, rise structures. Evacuation: Need Evacuation plans in high rise buildings, Making of Evacuation Plans, types of Evacuation, Procedure. Basic fire-fighting strategy. High-rise building with complex occupancy.	SL5. Learn evacuation drill in a commercial shopping high rise building. SL5.2 Make a list of different occupancy with example and give minimum 5 examples of complex occupancy.
SO5.2 Learning Fire fighting arrangements in high rise building as per NBC PART4 including water requirement calculation.			

SW-5 Suggested Sessional Work (SW):

a. Assignments:

1. Write the notes on Regulatory Framework for Pollution Control in Process Industries: Case Studies and Implications.
2. Explain, Integrated Pollution Control Strategies in Process Industries

b. Mini Project:

1. Assessment and Implementation of Air Pollution Control Measures in Cement Industry
2. Prepare the Treatment and Water Conservation Strategies in Paper Manufacturing.
3. Sustainable Practices in Textile and Tannery Industries: Wastewater Treatment and Chemical Management.

Legend: CI: Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others), LI: Laboratory Instruction (Includes Practical performances in Laboratory, Workshop, field or other locations using different instructional strategies) SL: Self Learning.

Note: Performance under Laboratory and Sessional work may appear in more than one COs/SOs.

I) Suggested Specification Table (For ESE of Classroom Instruction CI+SW+SL):

Unit Number	Unit Title	Marks Distribution			Total Marks
		R	U	A	
I	Constructional feature of Aircraft and related emergencies	4	6	4	14
II	Airport and hangers	4	6	4	14
III	Fundamentals of marine industry	4	6	4	14
IV	Marine fire and safety	4	6	4	14
V	Safe building design for high rise building	4	6	4	14
Total		20	30	20	70

Legend: R: Remember, U: Understand, A: Apply and above

J) Suggested Specification Table (For ESE of Laboratory Instruction*):

Laboratory Instruction Number	Short Laboratory Experiment Title	Assessment of Laboratory Work (Marks)		
		Performance		Viva-Voce
		PRA	PDA	
-	-	-	-	-

*Assessment rubric, process and product check list with rating scale need to be prepared by the course wise teachers for each experiment for conduction and assessment of laboratory experiments /practicals

Legend : PRA: Process Assessment, PDA : Product Assessment

Note : Only one experiment has to performed at the end semester examination of 40 Marks as per assessment scheme.

(K) Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Industrial visits
4. Industrial Training
5. Demonstration
6. Others

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L) Suggested Learning Resources:

(a) Books :

S.No.	Title	Author	Publisher	Edition & Year
1.	AIRPORT SERVICES MANUAL PART 1 RESCUE AND FIRE FIGHTING	ICAO	INTERNATIONAL CIVIL AVIATION ORGANIZATION	2014 NOTE:WHATEVER LATEST VERSION.
2.	The Fire Hazards of Fuelling Aircraft in the Open	--	D.S.I.R., H.M.S.O. London.	1993.
3.	National Building Code of India part-IV life and safety	Govt. document	BIS	2016
4.	NFPA 1925, 1910, 302 ETC and other relevant to marine safety	NFPA	NFPA	LATEST VERSIONS.
5.	Reeds Vol 5: Ship Construction for Marine Engineers,	Paul A Ruseell & EA stokoe	Macmillan	7th Edition, 2022

(b) Open source website address:

1. <https://www.dgca.gov.in/>
2. <https://store.icao.int/en/airport-services-manual-part-i-rescue-and-firefighting-doc-9137p1>
3. <https://www.nfpa.org/for-professionals/codes-and-standards>

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M) Mapping of POs & PSOs with COs:

Course Outcomes (COs) Titles	Programme Outcomes (POs)										Programme Specific Outcomes (PSOs)	
	Basic knowledge PO-1	Discipline knowledge PO-2	Experiments & Practice PO-3	Engineering Tools PO-4	The Engineer & Society PO-5	Environment & Sustainability PO-6	Ethics PO-7	Individual & Team work PO-8	Communication PO-9	Life Long learning PO-10	PSO-1	PSO-2
CO-1: Students will have fundamental understanding constructional features of a aircraft, emergency landings and procedures.	2	3	2	2	2	0	0	2	0	1	2	1
CO-2: Students will learn about aircraft and hangers and associated hazards.	2	2	3	2	2	0	0	1	0	2	2	1
CO-3: Students will learn about fundamentals of marine industry.	2	2	3	2	2	0	0	1	0	2	2	1
CO-4: Students will learn about associated hazards, fire scenarios, & respective emergency procedures.	2	2	3	2	2	0	0	1	0	2	2	1
CO-5: Students will learn about fire safe buildings design.	2	2	3	2	2	0	0	1	0	2	2	2

Legend: 1 – Low, 2 – Medium, 3 – High

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N) Course Curriculum Map:

POs & PSOs No.	COs No.& Title	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self Learning (SL)
PO-1,2,3,4,5,8,10 PSO-1,2	CO-1: Students will have fundamental understanding constructional features of a aircraft, emergency landings and procedures.	SO1.1	--	1.1	SL1.1
		SO1.2		1.2	SL1.2
		SO1.3		1.3	
		1.4			
		1.5			
PO-1,2,3,4,5,8,10 PSO-1,2	CO-2: Students will learn about aircraft and hangers and associated hazards.	SO2.1	--	2.1	SL2.1
		SO2.2		2.2	SL2.2
				2.3	
				2.4, 2.5	
PO-1,2,3,4,5,8,10 PSO-1,2	CO-3: Students will learn about fundamentals of marine industry.	SO3.1	--	3.1	SL3.1
		SO3.2		3.2	SL3.2
		SO3.3		3.3	
				3.4	
PO-1,2,3,4,5,8,10 PSO-1,2	CO-4: Students will learn about associated hazards, fire scenarios, & respective emergency procedures.	SO4.1	--	4.1	SL4.1
		SO4.2		4.2	SL4.2
				4.3	
				4.4	
PO-1,2,3,4,5,8,10 PSO-1,2	CO-5: Students will learn about fire safe buildings design.	SO5.1	--	5.1	SL5.1
		SO5.2		5.2	SL5.2
				5.3	
				5.4	
				5.5	

Legend: CI: Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others), LI: Laboratory Instruction (Includes Practical performances in Laboratory, Workshop, field or other locations using different instructional strategies) SL: Learning.

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- A) **Course Code** : 2129674(020)
 B) **Course Title** : Paramedics
 C) **Pre- requisite Course Code and Title** :
 D) **Rationale** :

This subject deals with understanding the various systems such as Respiratory, digestive, musculoskeletal etc. systems so that the student can have biological understanding of various injuries and emergencies related to human body in case of an industrial accident or emergency and in such scenario one can perform casualty handling by making of a diagnosis based on symptoms as Narrated by the casualty and signs as observed by the paramedic, till the professional medical team/help reaches or is available.

E) **Course Outcomes:**

CO-1: Student will know about different human body systems and their functioning.

CO-2: Student will learn to make diagnosis about the casualty.

CO-3: Student will learn to handle casualty with head, chest and abdomen specific injuries.

CO-4: Student will be able to make records of observation and line of treatment related to casualty and about ways to transport various cases of casualty.

CO-5: Student will learn about handling casualty related to drowning, bites, cold, sound etc.

D) **Scheme of Studies:**

Board of Study	Course Code	Course Titles	Scheme of Studies (Hours/Week)			Credits L+T+(P/2)
			L	P	T	
Civil Engineering	2129674(020)	Paramedics	2	-	1	3
Civil Engineering	2129661(020)	Paramedics (Lab)	-	2	-	1

L- Lecture,

T- Tutorial,

P- Practical,

Legend: Lecture (L) → CI: Classroom Instruction (Includes different instructional strategies i.e. Lecture and others).

Practical (P) → LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies).

Tutorial (T) → SL: Self Learning.

E) **Scheme of Examination:**

Board of Study	Course Code	Course Titles	Scheme of Examination					
			Theory			Practical		Total
			ESE	CT	TA	ESE	TA	Marks
Civil Engineering	2129674(020)	Paramedics	70	20	30	-	-	120
Civil Engineering	2129661(020)	Paramedics (Lab)	-	-	-	40	60	100

ESE: End Semester Exam,

CT: Class Test,

TA: Teachers Assessment

Legend- PRA: Process Assessment, PDA: Product Assessment

Note:

- TA in Theory includes Sessional work (SW) and attendance (ATT) with weightage of 70% and 30% of total respectively.
- TA in practical includes performance of PRA, PDA and Viva-Voce with weightage of 50%, 40% and 10% respectively.
- 85% attendance is essential in theory and practical classes to appear in Examination.

H) Course-Curriculum Detailing:

This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW) and Self Learning (SL). Students are expected to demonstrate the attainment of Session Outcomes (SOs) and finally Course Outcomes (COs) upon the completion of course. Convert unit of the given physical quantity from one unit system to other.

CO-1: Student will know about different human body systems and their functioning.

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
SO1.1 To learn about various human body system with their functioning and terminologies.	LI1.1 To calculate the blood pressure of an adults person using mercury sphygmomanometer and stethoscope apparatus.	UNIT-1.0 Study of various human body systems: 1.1 Musculoskeletal system, Digestive system its functioning, terminology & associated occupational risks. 1.2 Respiratory system it's functioning, terminology & associated occupational risks. 1.3 Circulatory system its functioning, terminology & associated occupational risks. 1.4 Central Nervous system it's functioning, terminology & associated occupational risks. 1.5 Examination of functions such as pulse, breathing, movements of the chest and abdomen, movements of various joints of the body.	SL1.1 Prepare a list of chronic human body conditions with respect to the mentioned human body system (at least 3 of each).
SO1.2 To learn about various associated occupational risk of respective human body systems.	LI1.2 To calculate the body mass index of an adult person by using surgical height measuring scale with digital weighting machine.		SL1.2 To learn exact procedure for measuring expansion capacity of chest correlating it with probable underlying health condition.
SO1.3 To know about externally examining different functions airways, chest movement, pulse rate, joint mobility etc.			

SW-1 Suggested Sessional Work (SW):

a. Assignments:

- What is the most common industrial associated risk with respiratory system?
- How the central nervous system may get affected by an industrial accident?
- Discuss about different types of joints and muscles in the human musculoskeletal system.
- Explain the examination procedure for an unconscious casualty?

b. Mini Project:

1. Prepare a presentation on a human body system detailing its various parts, function, associated risks.

CO-2: Student will learn to make diagnosis about the casualty.

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
SO2.1 To know the importance of preliminary diagnosis when you are a part of emergency response. SO2.2 To know about signs and indications that confirms a diagnosis & conducting a diagnosis. SO2.3 To learn about burns and their categories so that an accurate diagnosis could be made about the severity of the burn.	LI2.1 To calculate the scale of burn.	Unit 2.0 Diagnosis: 2.1 Introduction to medical diagnosis, characteristics of good diagnosis, accuracy of diagnosis and its importance in emergency response. 2.2 History taking, making of a diagnosis based on symptoms as Narrated by the casualty and signs as observed by the paramedic. 2.3 Checking temperature pulse, respiration, blood pressure, swellings, and discoloration of the skin, wounds, deformities etc. to confirm the diagnosis. 2.4 Study of various types of burns and their complications. 2.5 Study of maintenance of various charts related to such casualties and their importance.	SL2.1 Collect charts of blood pressure (low and high), pulse rate, temperature etc in order to become familiar with reading medical charts and understand the significance of normal and abnormal ranges.

SW-2 Suggested Sessional Work (SW):

a. Assignments:

1. What is the importance of Diagnosis of injured person/casualty during an emergency response.
2. Outline the characteristics of a good diagnosis.
3. Explain in detail the various parameters which are used to confirm the diagnosis
4. Explain in detail about the damage caused by various degree of burn & how to identify the category of burn?
5. Describe what do you mean by accuracy of diagnosis?

b. Mini Project:

1. Prepare a diagnosis report of a casualty.

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CO-3: Student will learn to handle casualty with head, chest and abdomen specific injuries.

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
SO3.1 Students will learn about injuries specific to head, chest & abdomen causes & consequences related to these injuries.	LI3.1 To measure the bleeding time and clotting time of healthy adult person using rigid splints.	Unit-3.0 head, chest and abdomen specific injuries: 3.1 Study of specific injuries to head chest and abdomen Causes and consequences of external and internal bleeding. 3.2 Paramedical care of various types of Casualties and their injuries such as wounds, burns, injuries of bones and joints, disturbances in vital function Joints- and connections.	SL3.1 Make a list of injuries (at least 10) related to head chest & abdomen which are caused by an industrial activity/accident.
SO3.2 To learn to take care of injuries such as wounds, burns, injuries of bones and joints, disturbances in vital function Joints-and connections.	LI3.2 To calculate the victim dressing time using various type of bandage by first aid responder.	3.3 Cardiopulmonary resuscitation, artificial respiration by manual and instrumental methods, bandages, splints, correction of shock, arrest of bleeding, treatment of hyperpyrexia.	SL3.2 find out the legal requirements related to ambulance and first aid box in industries as per factories act and factories rule of the state.
SO3.3 Perform CPR, Artificial respiration, bandages, splints, arresting bleeding, treating hyperpyrexia.			

SW-3 Suggested Sessional Work (SW):

a. Assignments:

1. Explain in detail how to perform CPR, how does it vary with respect to the age of the casualty?
2. What are the different types of joints in human body and what are the associated injuries to these joints?
3. With respect to use how does bandages differ from a splint?

b. Mini Project:

1. Prepare a report comparing Indian and global scenario in respect to emergency medical response (such as CPR, quick communication to medical services, debriefing to them etc.) awareness and importance and difference does it make?

CO-4: Student will be able to make records of observation and line of treatment related to casualty and about ways to transport various cases of casualty.

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
SO4.1 To know about reading and making report of observations of the casualty which is high importance to doctors. SO4.2 To learn about how to correctly position a casualty asper the injury. SO4.3 To know about stretchers their types correct loading and unloading of casualty SO4.4 To know about various aspects of transporting of casualty transportation. SO4.5 To know about necessary Ambulance requirements for transporting casualty.	LI 4.1 To study different types and ways of using a stretcher for casualty transportation.	Unit-4.0 Maintaining records and transportation of casualty: 4.1 Maintenance of observation charts, treatment administered temperature-pulse-respiration records. 4.2 appropriate positioning of casualties affected by head injuries, chest injuries, abdominal injuries, bleeding etc. 4.3 Stretchers for casualty transportation and its various types. 4.4 Transportation of casualties on stretchers, across plain ground, through obstacles. 4.5 Stretcher drill, loading and unloading of casualties in stretchers and ambulances, 4.6 Ambulance installations and their use in casualties during transportation etc.	SL4.1 Find the list of codes and standard related to ambulances in India.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

1. What are the various types of stretchers and their exclusive importance used in casualty transportation?
2. What measures are necessary to be followed prior to the transportation of a casualty?
3. Discuss in detail regarding the installations which are necessary for a medical ambulance for casualty transportation.

b. Mini Project:

1. Prepare a detailed report on casualty positioning, loading& unloading a casualty?

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CO-5: Will learn about handling casualty related to drowning, bites, cold, sound etc.

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
SO5.1 To learn how to handle casualty of extreme temperature exposure.	LI5.1 Studying the emergency response for extreme temperature stresses.	UNIT-5.0 Casualty of bites, drowning, hot, cold stresses etc. 5.1 Casualties affected by heat and cold stresses and measures necessary for their care.	SL5.1 Prepare a list of industries (minimum 10) which presents hazard of hot and cold stresses describing the activity as well.
SO5.2 To learn how to handle casualties of drowning, poisoning, high sound exposure, explosion, radiation	LI5.2 Studying the emergency response for Casualties of drowning.	5.2 Casualties of drowning, poisoning, pressure, inebriations, high sound.	SL5.2 Mention the activities which may result casualty of high sound.
SO5.3 To learn how to handle casualties of Bites of animal and insects.	LI5.3 Practice and performing CPR	5.3 Explosions, nuclear radiations and their paramedical care. 5.4 Bites of animals such as snakes, dogs and various insects and their paramedical care.	

SW-5 Suggested Sessional Work (SW):

a. Assignments:

- In case of a casualty of snake bite explain the following:
 - Identifying and confirming the snake bite
 - Dos and DONTs which shall be followed
- What steps shall be followed while dealing with casualty of drowning
- While dealing with an explosion affected casualty what shall be line of action as first responder?

Legend: CI: Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others), LI: Laboratory Instruction (Includes Practical performances in Laboratory, Workshop, field or other locations using different instructional strategies) SL: Self Learning.

Note: Performance under Laboratory and Sessional work may appear in more than one COs/SOs.

D) Suggested Specification Table (For ESE of Classroom Instruction CI+SW+SL):

Unit Number	Unit Title	Marks Distribution			Total Marks
		R	U	A	
I	Study of various human body systems	4	6	4	14
II	Diagnosis	4	6	4	14
III	Head, chest and abdomen specific injuries	4	6	4	14
IV	Maintaining records and transportation of casualty.	4	6	4	14
V	Casualty of bites, drowning, hot, cold stresses etc.	4	6	4	14
Total		20	30	20	70

Legend: R: Remember, U: Understand, A: Apply and above

J) Suggested Specification Table (For ESE of Laboratory Instruction*):

Laboratory Instruction Number	Short Laboratory Experiment Title	Assessment of Laboratory Work (Marks)		
		Performance		Viva-Voce
		PRA	PDA	
LI1.1	To calculate the blood pressure of an adults person using mercury sphygmomanometer and stethoscopeapparatus.	20	15	5
LI1.2	To calculate the body mass index of an adult person by using surgical height measuring scale with digital weightingmachine.			
LI1.3	To measure the working efficiency of human lungs with lung testing apparatus.			
LI2.1	To calculate the scale of burn.			
LI3.1	To measure the bleeding time and clotting time of healthyadult person using v rigid splints.			
LI3.2.	To calculate the victim dressing time using various type ofbandage by first aid responder.			
LI 4.1	To study different types and ways of using a stretcher for casualty transportation.			
LI 5.1	Studying the emergency response for extreme temperaturestresses.			
LI 5.2	Studying the emergency response for Casualties of drowning.			
LI 5.3	Practice and performing CPR.			

J) List of Major Laboratory Equipment and Tools:

S. No.	Name of Equipment	Broad Specifications	Relevant Experiment Number
1	Weight & height measuring device	For accurate measurement of height and weight measurement of a person	LI1.2
2	Peak flowmeter	Hand-held device that measures ability to push air out of your lungs (With disposable mouth pieces for separate students/performer)	LI1.3
3	Blood pressure measuring device	Cuff, inflator, sphygmomanometer, stethoscope.	LI1.1
4	Bandages, splint, & dressings	Elastic bandage ranging from 2 inch to 6 inch (latex free), Triangular bandage (40 inch on each side), Adhesive bandage of small large and medium size. SAM, Vacuum, cardboard splints. Dressings (Sterilize gauze, non-adherent etc.)	LI3.2.
5	Stretchers for casualty transport	Standard Ambulance Stretcher, Scoop Stretcher, Basket Stretcher, Bariatric Stretcher, Pediatric.	LI 4.1
6	CPR manikin	Advanced CPR manikin with indication light.	LI 5.3

*Assessment rubric, process and product check list with rating scale need to be prepared by the course wise teachers for each experiment for conduction and assessment of laboratory experiments /practicals

Legend : PRA: Process Assessment, PDA : Product Assessment

(K) Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Industrial visits
4. Industrial Training
5. Demonstration
6. Others

L) Suggested Learning Resources:

(a) Books :

S.No.	Title	Author	Publisher	Edition & Year
1	Fire Service emergency care.	Edward T Dickinson	Pearson	1998
2	Indian First Aid Manual	--	Indian Red Cross Society	2016 7 th Edition
3	First Aid to injured,	Cantlie, James	Forgotten Books	2018
4	First Aid	L.G Gupta & Abhitabh Gupta	Jaypee Brothers	
5	Paramedics 6-in-1 Handbook	G.D Mogli	Jaypee Brothers	2003

(b) Open source software and website address:

1. <https://www.osha.gov/electrical>
2. <https://www.hse.gov.uk/electricity/>
3. <https://www.esfi.org/>
4. <https://indianredcross.org/ircs/aboutus>
5. <https://www.bite-pro.com/content/human-bite-injuries.html>
6. http://www.ohsu.edu/health/md4kids/healthimages/fa_stinger.php

Chhattisgarh Sami Vivekanand Technical University, Bhilai

Diploma in Industrial Safety & Fire Safety Engineering

Semester -VI

N) Mapping of POs & PSOs with COs:

Course Outcomes (COs) Titles	Programme Outcomes (POs)										Programme Specific Outcomes (PSOs)	
	Basic knowledge PO-1	Discipline knowledge PO-2	Experiments & Practice PO-3	Engineering Tools PO-4	The Engineer & Society PO-5	Environment & Sustainability PO-6	Ethics PO-7	Individual & Team work PO-8	Communication PO-9	Life Long learning PO-10	PSO-1	PSO-2
CO-1: Student will know about different human body systems and their functioning.	2	3	2	2	2	0	0	2	0	1	2	1
CO-2: Student will learn to make diagnosis about the casualty	2	2	3	2	2	0	0	1	0	2	2	1
CO-3: Student will learn to handle casualty with head, chest and abdomen specific injuries	2	2	3	2	2	0	0	1	0	2	2	1
CO-4: Student will be able to make records of observation and line of treatment related to casualty and about ways to transport various cases of casualty	2	2	3	2	2	0	0	1	0	2	2	2
CO-5: Student will learn about handling casualty related to drowning, bites, cold, sound etc	2	2	3	2	2	0	0	1	0	2	2	1

Legend: 1 – Low, 2 – Medium, 3 – High

Chhattisgarh Sami Vivekanand Technical University, Bhilai

Diploma in Industrial Safety & Fire Safety Engineering

Semester -VI

N) Course Curriculum Map:

POs & PSOs No.	COs No.& Title	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self Learning (SL)
PO-1,2,3,4,5,8,10 PSO-1,2	CO-1: Student will know about different human body systems and their functioning.	SO1.1 SO1.2 SO1.3	LI1.1 LI1.2	1.1 1.2 1.3 1.4 1.5	SL1.1 SL1.2
PO-1,2,3,4,5,8,10 PSO-1,2	CO-2: Student will learn to make diagnosis about the casualty	SO2.1 SO2.2 SO2.3	LI2.1	2.1 2.2 2.3 2.4 2.5	SL2.1
PO-1,2,3,4,5,8,10 PSO-1,2	CO-3: Student will learn to handle casualty with head, chest and abdomen specific injuries	SO3.1 SO3.2 SO3.3	LI3.1 LI3.2	3.1 3.2 3.3 3.4 3.5	SL3.1 SL3.2
PO-1,2,3,4,5,8,10 PSO-1,2	CO-4: Student will be able to make records of observation and line of treatment related to casualty and about ways to transport various cases of casualty	SO4.1 SO4.2 SO4.3 SO4.4	LI4.1	4.1 4.2 4.3 4.4 4.5 4.6	SL4.1
PO-1,2,3,4,5,8,10	CO-5: Student will learn about handling casualty related to drowning, bites, cold, sound etc	SO5.1 SO5.2 SO5.3	LI5.1 LI5.2 LI5.3	5.1 5.2 5.3 5.4	SL5.1 SL5.2

Legend: CI: Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others), LI: Laboratory Instruction (Includes Practical performances in Laboratory, Workshop, field or other locations using different instructional strategies) SL: Self Learning.

- A) Course Code : 2129675(037)
B) Course Title : Entrepreneurship Development and Management
C) Pre- requisite Course Code and Title :
D) Rationale :

Our fast growing economy provides ample opportunities for diploma engineers to succeed in entrepreneurship. Diploma engineers can be their own masters and job provider to others by starting their service industry/assembly/marketing/consultancy/manufacturing enterprises. As entrepreneurship requires distinct set of skills which may not be developed while undergoing technical subjects. Hence a separate course has been introduced for developing such skills set amongst diploma students. This course aims at developing competencies in the diploma engineer for becoming an intrapreneur or a successful entrepreneur. After successfully completing this course students who develop qualities of successful entrepreneur can set up their own manufacturing industry/service industry/business/startup or be self employed and those who prefer job can become intrapreneur and share profits with their company.

E) **Course Outcomes**

CO-1 Demonstrate traits of a successful intrapreneur/entrepreneur

CO-2 Analyze the level of achievement motivation by preparing one's own portfolio.

CO-3 Innovate products and services using creativity techniques.

CO-4 Manage critical resources from support institutions.

CO-5 Prepare sustainable small business plans.

F) **Scheme of Studies:**

S.No.	Board of Study	Course Code	Course Title	Scheme of Studies (Hours/Week)			
				L	P	T	Total Credits(C) L+T+(P/2)
1	Mechanical Engineering	2129675(037)	Entrepreneurship Development and Management	2	-	1	3

L- Lecture,

T- Tutorial,

P- Practical,

Legend: Lecture (L) → CI: Classroom Instruction (Includes different instructional strategies i.e. Lecture and others).

Practical (P) → LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies).

Tutorial (T) → SL: Self Learning.

G) **Scheme of Assessment:**

Scheme of Assessment									
S. No	Board of Study	Course Code	Course Title	Scheme of Examinations					
				Theory			Practical		Total Marks
				ESE	CT	TA	ESE	TA	
1	Mechanical Engg.	2129675(037)	Entrepreneurship Development and Management	70	20	30	-	-	120

Note:

- TA in Theory includes Sessional work (SW) and attendance (ATT) with weightage of 70% and 30% of total respectively.
- TA in practical includes performance of PRA, PDA and Viva-Voce with weightage of 50%, 40% and 10% respectively.
- 85% attendance is essential in theory and practical classes to appear in Examination.

H) Course-Curriculum Detailing:

This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (L), Laboratory Instruction (P), T- Tutorial includes Sessional Work (SW) and Self Learning (SL). Students are expected to demonstrate the attainment of Session Outcomes (SOs) and finally Course Outcomes (COs) upon the completion of course.

CO-1 Demonstrate traits of a successful intrapreneur /entrepreneur.

(Approx. Hrs: L+T=9)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
SO1.1 Select intrapreneurship or entrepreneurship as a career based on the qualities possessed by an individual. SO1.2 Identify various avenues of entrepreneurship for diploma engineers. SO1.3 Demonstrate qualities of successful intrapreneur /entrepreneur. SO1.4 Explain various steps in establishment of enterprise. SO1.5 Select an area of business opportunity as per your interest.	--	Unit 1.0 Characteristics of entrepreneurs 1.1 Concept of entrepreneur and intrapreneur 1.2 Benefits of becoming an intrapreneur/ entrepreneur. 1.3 Scope of entrepreneurship in local and global market. 1.4 Planning for establishment of an enterprise. 1.5 Traits of successful intrapreneur/ entrepreneur and passion, initiative, independent decision making, team work, assertiveness, persuasion, persistence, information seeking, commitment to work contract etc. SW analysis. Team work simulation. 1.6 Trait of successful entrepreneur: calculated risk taking. Risk taking simulation exercise. 1.7 Business opportunity Guidance	<ul style="list-style-type: none">History of entrepreneurship.Definition of entrepreneurshipSocial entrepreneurship

SW-1 Suggested Sessional Work (SW):

a. Assignments:

- Identify existing needs of the institute/college and convert them into business opportunity.

- ii. Enumerate characteristics of assigned first generation successful entrepreneurs, intrapreneurs, managers by preparing a presentation.
- iii. Analyze the reasons for success and failure of the assigned entrepreneurs by preparing ppt on the basis of news, articles, reviews, video etc.

b. Mini project:

- i. Interviewing few local entrepreneurs and prepare a collage on "Traits of successful entrepreneurs".
- ii. Identify traits to be developed in you for becoming a successful entrepreneur based on your strength and weakness analysis and submit an action plan to develop the same.
- iii. Organize "best from waste" competition.

c. Other Activities:

- i. Identify your hobbies and interests and convert them into business idea.
- ii. Organize seminar on history of entrepreneurship, Definition and selected case studies of social entrepreneurship.

CO-2 Analyze the level of achievement motivation by preparing one's own portfolio.

(Approx. Hrs: L+T= 10)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
<p>SO2.1 Explain the concept of achievement motivation.</p> <p>SO2.2 Assess level of need for Achievement in the individual through different tools.</p> <p>SO2.3 Prepare an action plan for enhancing need for achievement.</p>	--	<p>Unit 2.0 Motivation Management</p> <p>2.1 Motives, motivation and motivational cycle.</p> <p>2.2 Concept of Need for Achievement.</p> <p>2.3 Need for Achievement assessment through various tools.</p> <ul style="list-style-type: none"> • Ring toss game • Boat making exercise • Building block exercise • TAT stories • Who am I? <p>2.4 Interpretation and action plan for self development.</p>	<ul style="list-style-type: none"> • Kakinada experiment Techno-preneurship.

SW-2 Suggested Sessional Work (SW):

a. Assignments:

- i. Prepare a portfolio based on achievement motivation exercise and tasks.

b. Mini project:

- i. Prepare a report on need for achievement exercises.
- ii. Develop achievement motivation field exercises.

c. Other Activities:

- i. Prepare a plan for development of achievement motivation and execute it.
- ii. Develop case studies on Techno-preneurship.
- iii. Prepare a report on Kakinada experiment.

CO-3 Innovate products using creativity techniques.

(Approx. Hrs: L+T= 10)

Session Outcomes (SOs)	Laboratory	Class room Instruction (L)	Self Learning (SL)
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	Instruction (P)		
SO3.1 Elucidate the use of creativity techniques for entrepreneurs. SO3.2 Improve a chosen product using brainstorming technique. SO3.3 Differentiate between creativity and innovation. SO3.4 Apply concept of product life cycle for conceiving a project. SO3.5 Design a product using new product development process.	--	Unit 3.0 Management of Creativity & Innovation 3.1 Creativity: Divergent thinking, creativity techniques. 3.2 Innovation, types and applications 3.3 Product life cycle, New product development process. Product development and innovation through creativity and innovation.	<ul style="list-style-type: none"> • Check list of questions. • Six thinking hats. • Case study of innovative first generation entrepreneur. • Schemes and incentives for innovation. • Innovative solutions for social problems.

SW-3 Suggested Sessional Work (SW):

a. Assignments:

- Use the assigned creativity technique for improvement of product characteristic.
- Use the assigned creativity technique for improvement of service process characteristic.

b. Mini project:

- Apply innovative practices in different process of an enterprise.

c. Other Activities:

- Prepare a prototype of a creative solution to industrial/ social problem.
- Organise seminar on Schemes and incentives for innovation, Innovative solutions for social problems and Kakinada experiment.

CO-4 Manage critical resources from support institutions.

(Approx. Hrs: L+T= 10)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
SO4.1 Select appropriate form of business organization for enterprise SO4.2 Identify entrepreneurship support institutions for technical/ marketing and finance. SO4.3 Explain salient features of entrepreneurship promotion schemes of centre and state.	--	Unit 4.0 Critical Resources 4.1 Forms of business organization: Proprietorship, Partnership, Cooperative, Private, Public Ltd Company, Section 8 company, LLP 4.2 Institutional Support for entrepreneurship: MSMESI, CED, DTIC, CITCON, CSIDC, LUN, NSIC, KVIC, NABARD, Banks, SIDBI 4.3 Entrepreneurship promotion schemes of centre and state. 4.4 Marketing Mix, Market survey for project identification 4.5 Inventory control, vendor development, material movement, store management. 4.6 Manpower plan, hiring process, compensation, performance	<ul style="list-style-type: none"> • Establishment procedure of Proprietorship, LLP, Cooperative, Section 8 company, LLP Factory Act, Labour Laws, GST.

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
SO4.4 Prepare a marketing mix plan for identified industry. SO4.5 Develop a materials management plan. SO4.6 Develop a human resource plan.		appraisal.	

SW-4 Suggested Sessional Work (SW):

a. Assignments:

- Examine suitability of different forms of business organization for the given project and prepare a presentation for the same.
- Conduct a market survey and prepare a report along with marketing mix plan for the given project.
- Prepare materials management strategy for a business or manufacturing unit and submit a report.
- Prepare a man power plan chart and job specifications for identified positions.

b. Mini project:

- Explore facilities extended by support institutions to entrepreneurs for marketing of the given situation.
- Investigate facilities extended by support institutions to entrepreneurs for technical support of the given situation.
- Identify facilities extended by support institutions to entrepreneurs for financial support of the given situation

c. Other Activities:

- Visit the assigned agencies engaged in institutional support for entrepreneurship and make a report.
- For your selected project decide a unique name of the enterprise, logo, signboard, letterhead and pamphlet.
- Organize a seminar on establishment procedure of proprietorship, LLP, cooperative, section 8 company, factory act, labour laws and GST.

CO-5 Prepare sustainable small business plans.

(Approx. Hrs: L+T= 9)

Session Outcomes (SOs)	Laboratory Instruction (P)	Class room Instruction (L)	Self Learning (SL)
SO5.1 Prepare business plan/techno economic feasibility report. SO5.2 Calculate and comment on breakeven point for given project. SO5.3 Explain financing of startups.	--	Unit 5.0 Sustainable business plan 5.1 Format of business plan/techno-economic feasibility report. 5.2 Demand and annual production target based on market survey. 5.3 Outline production/service process. 5.4 Land, building and machinery requirement. 5.5 Power, utilities and raw material	<ul style="list-style-type: none"> Techno-economic feasibility report of MSME. Startup process. Angel Investors. Venture capitalist. Incubators.

Session Outcomes	Laboratory	Class room Instruction	Self Learning (SL)
		requirement. 5.6 Fixed capital, Working capital, Subsidy and Cost of Project. 5.7 Means of finance, calculation of interest. 5.8 Profitability analysis, Break-even point.	

SW-5 Suggested Sessional Work (SW):

a. Assignments:

- Describe the procedure of registration and availing of facilities from the assigned support institution.
- Prepare a process plan for the selected project.

b. Mini project:

- Prepare a marketing plan for the assigned project.
- Prepare a financial plan for the assigned project.
- Prepare a technical feasibility plan for the assigned project.
- Prepare a techno-economical feasibility report of the assigned project.

c. Other Activities:

- Analyse a case study on startups focusing on financing from angel investor and venture capitalist.
- Organize seminar on Startup process, Angel investors, Venture Capitalist and Incubators

Note: Performance under Laboratory and Sessional work may appear in more than one COs/SOs.

I) Suggested Specification Table (For ESE of Classroom Instruction):

Unit Number	Unit Title	Marks Distribution			Total Marks
		R	U	A	
I	Characteristics of entrepreneurs	4	6	4	14
II	Motivation Management	4	6	4	14
III	Management of Creativity and Innovation	4	6	4	14
IV	Critical Resource	4	6	4	14
V	Sustainable Business Plan	4	6	4	14
Total		20	30	20	70

Legend: R: Remember, U: Understand, A: Apply and above

J) Suggested Specification Table (For ESE of Laboratory Instruction*): Not Applicable

K) Suggested Instructional/Implementation Strategies:

- Improved Lecture
- Tutorial
- Case Method
- Group Discussion
- Field Trips
- Portfolio Based Learning

7. Demonstration
8. ICT Based Teaching Learning (Video Demonstration, CBT, Blog, Face book, Mobile)
9. Brainstorming

L) Suggested Learning Resources:

(a) Books :

S. No.	Titles	Author	Publisher	Edition & Year
1.	Entrepreneurial Development	Desai Vasant	Himalaya Publishing House	Mumbai/2017 ISBN 978 93 5097 383 7
2	Starting your own business, step by step Blue print for the First – time Entrepreneur	Harper Stephen C.	Mc Craw-Hill	2003 ISBN13: 9780071410120
3.	The Business Planning GUIDE	H.Bangs David	Upstart Publishing Company in Chicago	978-0793154098
4	Entrepreneurship Development in India	Gupta Dr.C.B. Shrinivasa NP	Sultan Chand & Sons	9788180548185
5	Entrepreneurship Development	Khanka Dr.S.S.	S.Chand New Delhi	ISBN 81 219 1801 4
6	Entrepreneurship Development and small Business Enterprises	Charantimath M.	Pearson Edu.Soc. INDIA	2013/ISBN 13 978 8131 762264
7.	Entrepreneurship Development	Sharma Sangita	PHI, DELHI	ISBN 978 81 203 5270 4

(b) Open source software and website address:

1. Free e books: <https://www.free-ebooks.net/book-list/entrepreneurship>
2. Startups: https://inc42.com/startups/?utm_source=top-menu&utm_medium=website&utm_campaign=menu
3. Indian Tech Startup funding report: https://pages.inc42.com/annual-indian-tech-startup-funding-report-2017/?utm_source=top-menu&utm_medium=website&utm_campaign=menu
4. Project profile: <https://my.msme.gov.in/MyMsmeMob/MsmeProjectProfile/Home.htm>
5. Project profile: <http://www.dcsmse.gov.in/publications/pmryprof/pjseries.html>
6. Project profile <http://www.dcsmse.gov.in/reports/ProjectProfile.htm>

M) List of Major Laboratory Equipment and Tools: Not Applicable

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Diploma in Civil Engineering

Semester -VI

N) Mapping of POs & PSOs with COs:

Course Outcomes (COs)	Programme Outcomes (POs)										Programme Specific Outcomes (PSOs)	
	PO-1 Basic knowledge	PO-2 Discipline knowledge	PO-3 Experiments and practice	PO-4 Engineering Tools	PO-5 The engineer and society	PO-6 Environment and sustainability	PO-7 Ethics	PO-8 Individual and team work	PO-9 Communication	PO-10 Life-long learning	PSO-1	PSO-2
CO-1 Demonstrate traits of a successful intrapreneur/entrepreneur.	-	3	-	-	2	2	2	2	2	2	-	-
CO-2 Analyse the level of achievement motivation by preparing one's own portfolio.	-	3	-	-	2	2	2	2	2	2	-	-
CO-3 Innovate products using creativity techniques.	-	3	-	-	2	2	2	2	2	2	-	-
CO-4 Manage critical resources from support institutions.	-	3	-	-	2	2	2	2	2	2	-	-
CO-5 Prepare sustainable small business plans.	-	3	-	-	2	2	2	2	2	2	-	-

Legend: 1 – Low, 2 – Medium, 3 – High

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Diploma in Civil Engineering

Semester -VI

O) Course Curriculum Map:

POs & PSOs No.	COs No. & Title	SOs No.	Laboratory Instruction (P)	Classroom Instruction (L)	Self Learning (SL)
PO-2,5,6,7,8, 9,10	CO-1 Demonstrate traits of a successful intrapreneur/entrepreneur.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	-	Unit 1.0 Characteristics of entrepreneurs 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7	As mentioned in relevant page numbers
PO-2,5,6,7,8, 9,10	CO-2 Analyse the level of achievement motivation by preparing one's own portfolio.	SO2.1 SO2.2 SO2.3	-	Unit 2.0 Motivation Management 2.1, 2.2, 2.3, 2.4	
PO-2,5,6,7,8, 9,10	CO-3 Innovate products using creativity techniques.	SO3.1 SO3.2 SO3.3 SO3.4 SO3.5	-	Unit 3.0 Management of Creativity and Innovation 3.1, 3.2, 3.3	
PO-2,5,6,7,8, 9,10	CO-4 Manage critical resources from support institutions.	SO4.1 SO4.2 SO4.3 SO4.4 SO4.5 SO4.6	-	Unit 4.0 Critical Resources 4.1, 4.2, 4.3, 4.4, 4.5, 4.6	
PO-2,5,6,7,8, 9,10	CO-5 Prepare sustainable small business plans.	SO5.1 SO5.2 SO5.3	-	Unit 5.0 Sustainable Business Plan 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8	

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Diploma in Industrial Safety & Fire Safety Engineering

Semester -VI

- A) Course Code : 2129662(020)
 B) Course Title : Fixed Fire Protection System (Lab)
 C) Pre- requisite Course Code and Title :
 D) Rationale :

E) Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of Studies (Hours/Week)			Total Credits(C) L+T+(P/2)
			L	P	T	
Civil Engineering	2129662(020)	Fixed Fire Protection System (Lab)	-	2	-	1

L- Lecture,

T- Tutorial,

P- Practical,

Legend: Lecture (L) → CI: Classroom Instruction (Includes different instructional strategies i.e. Lecture and others).

Practical (P) → LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies).

Tutorial (T) → SL: Self Learning.

F) Scheme of Examination:

Board of Study	Course Code	Course Titles	Scheme of Examination					
			Theory			Practical		Total
			ESE	CT	TA	ESE	TA	Marks
Civil Engineering	2129662(020)	Fixed Fire Protection System (Lab)	-	-	-	40	60	100

ESE: End Semester Exam

CT: Class Test,

TA: Teachers Assessment

Legend- PRA: Process Assessment, PDA: Product Assessment

Note:

- TA in Theory includes Sessional work (SW) and attendance (ATT) with weightage of 70% and 30% of total respectively.
- TA in practical includes performance of PRA, PDA and Viva-Voce with weightage of 50%, 40% and 10% respectively.
- 85% attendance is essential in theory and practical classes to appear in Examination.

G) Suggested Specification Table (For ESE of Laboratory Instruction*):

Laboratory Instruction Number	Short Laboratory Experiment Title	Assessment of Laboratory Work (Marks)		
		Performance		Viva-Voce
		PRA	PDA	
1.	Study of hose reel	20	15	5
2.	Study of Sprinkler system			
3.	Study of fire pumps and pump house.			
4.	To study various types of fire detectors.			
5.	To study fixed fire protection systems for transformers.			
6.	To study Risers, landing valve, Hosebox as a part of fixed fire fighting system for bulding			
7.	To study fire alarm system addressable and non- addressable panel.			
8.	To understand deluge valve operating system and its importance in various fixed fire suppression system.			
9.	To study Co2 flooding system.			
10.	To study fire water monitor system.			

H) List of Major Laboratory Equipment and Tools:

S. No.	Name of Equipment	Broad Specifications	Relevant Experiment Number
1	Hose reel	Type A & B hose reels complete set with drum set hose reel nozzle control valves.	01
2	Sprinkler	Sprinkler head (of various temperature rating & types upright, pendent, sidewall), for the purpose of demonstration working model of sprinkler system(range pipes, valves etc)	02
3	Fire detectors	Flame, heat & smoke detectors of IS approved standard	04
4	Riser system	Risers, Landing valve, hosebox, hose of IS approved standard	06
5	Fire alarm panel	Fire alarm panel (addressable and non-addressable type)	07

- A) Course Code : 2129663(020)
B) Course Title : Major Project
C) Pre- requisite Course Code and Title :
D) Rationale :

Project work plays a very important role in engineering educations in developing core technical skills, soft skills and higher level of cognitive, psychomotor and affective domain skills. It encourages the thinking process in the students.

Project work is normally done when students have acquired sufficient knowledge, skills and attitude and are able to integrate all these, entirely in new situation or task to solve the problems of the industries.

Through project work, students get direct exposure to the world of work in their relevant field. They are intrinsically motivated to explore new things, new methods, new design and many more ideas.

They also develop many soft skills like confidence, communication skills, creative ability, inquisitiveness, learning to learn skills, lifelong learning skills, problem solving skills, management skills, positive attitude, ethics etc. through project work.

Normally in a curriculum document, there is a mention of project work in two different situations.

In situation one, Project work is reflected as Mini Project under each and every course curricular detailing, in the form of sessional work mentioned under different semesters. These projects are normally related to the developing skills in respective course of the specific programme.

In another situation, project work is reflected as a complete course or as a major project in the total programme structure, normally at higher semester either at 4th, 5th and 6th, depending on the requirement of the programme Normally.

- E) **Course Outcomes: After completion of the project work of a course or full semester, the students will be able to -**

CO-1 Integrate the Knowledge (K), Skills (S), Attitudes (A) developed in a new task or problem identified in the form of project work.

CO-2 Develop higher level of cognitive, psychomotor and affective domain skills relevant to the course/programme.

CO-3 Integrate the generic skills/soft skills/employable skills with relevant technical skills for successful completion of the project work.

CO-4 Develop the skills of innovativeness, creativity, resourcefulness, time management, problem solving abilities, interpersonal skills, pro-activeness, cost effectiveness, environment consideration and sustainability.

- F) **Scheme of Studies:**

Board of Study	Course Code	Course	Scheme of Studies (Hours/Week)			Credit L+ T+P/2
			L	T	P	
Civil Engineering	2129663 (020)	Major Project	-	4	-	2

L- Lecture, T- Tutorial, P- Practical,

Legend: Lecture (L) → CI: Classroom Instruction (Includes different instructional strategies i.e. Lecture and others).

Practical (P) → LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies). Tutorial (T) → SL: Self Learning

G) Scheme of Assessment:

S. No	Board of Study	Course Code	Course Title	Scheme of Examinations					
				Theory			Practical		Total Marks
				ESE	CT	TA	ESE	TA	
1	Civil Engineering	2129663 (020)	Major Project	-	-	-	80	120	200

ESE: End Semester Exam, CT: Class Test, TA: Teachers Assessment

Legend - PRA : Process Assessment, PDA : Product Assessment

- Note: i) TA in Theory includes Sessional work (SW) and attendance (ATT) with weightage of 70% and 30% of total respectively.
ii) TA in practical includes performance of PRA, PDA and Viva-Voce with weightage of 50%,40% and 10% respectively.
iii) 85% attendance is essential in theory and practical classes to appear in Examination.

H) Guidelines to Teachers for Implementation of the Project Work :

Once the project is identified and allocated to students, teacher's role is very important. Teachers act as guide, facilitator, catalyser, motivator to promote brain storming, thinking, creatively, initiativeness and many other skills in the students. Teachers should help or guide continually to monitor whether the students are proceeding in the right direction as per outcomes to be attained.

It is also suggested that teachers are not supposed to guide and plan each and every step from the point of view of execution of the project, otherwise it will curb their creativity or thinking process. Teachers have to see that he or she is able to create think tank for this fast technological world of work for the growth of our country. Following points should be taken into consideration while planning and implementing the project work.

1. Identification of project and allocation methodology :

Though the teachers and students, both are involved in identification of project titles, but the prime responsibility of identification of project titles goes to the teachers involved in implementing the course or programme. Teachers are fully aware of course/programme curriculum. They are also aware of related industrial problems. They try to explore the possibility of identification of project titles through these problems.

These small industrial problems in the form of project titles may be brought into the laboratories or workshop of institutions of a specific programme, which are equipped with all necessary facilities and resources to carry out the project work. These labs or workshop can function as miniature industry to solve the industrial problems in the form of simulated industrial projects. These projects may be integrated problem of courses or programme.

The project identified may be application type, product type, Research type and review type.

1.1 Criteria for Identification and Implementation of Project Titles :

Identification of project title is planned to be done based on many considerations like :

- Cost effectiveness
- Safety considerations
- Ethical issues
- Environmental considerations
- Improvised process
- Improvised equipment
- Simulated industry's problem
- Application or utility in the world of work.
- Relevance to the Curriculum
- Mapping of Outcomes of Project with POs and PSOs

- Feasibility of implementation of the project

2. Implementation and Evaluation of Project Work:

Once the identification of project titles and guide allocation process is over, quality of student's project, on different criteria including the report writing need to be continually monitored.

Projects planning, design, execution and report writing is done by the students under the guidance and feedback by respective teachers for attainment of courses specific outcomes, POs and PSOs.

Continual Monitoring, feedback and assessment mechanism on weekly progress/updates on action taken on different criteria and sub-criteria of the project work need to be planned for individual and team of students. Path breaking teachers who think out of the box are required to guide, monitor and evaluate the project work.

For objective, valid and reliable assessment, teachers should use different tools of assessment such as checklist, rating scale, assessment rubric, observation schedule, portfolio assessment, incidental records etc. Even the students may be encouraged to adopt self assessment techniques using the assessment rubrics.

2.1 Criteria of Evaluation of Project:

The different criteria of evaluation of project under different sub heads of project work completion are given below :

2.2.1 Project Planning :

Project planning, its action plan, steps of realizing the projects, may be specifically planned in advance based on feasibility, resources available, time allocation, finance and manpower requirement for each and every step or activity of project work.

Under project planning, many points need to be considered like -

- Selection of relevant industry based projects as per the requirement of curriculum
- Rationale/Application
- Objectives Set
- Literature survey

Literature survey on the project title need to be done through abstract, journals, websites, open sources and other relevant sources available.

It need to be ensured that objectives are written properly with clear specific, measurable and attainable statements. The sample size has to be delimited and decided as per the time limit allotted, feasibility and many other considerations.

Objectives formulated will decide the further course of action, depth and breadth of the project and implementation plan.

2.2.2 Design, Development and Execution of Project :

Following important characteristic features of project are need to be given special emphasis during the implementation of the project work-

- Innovativeness
- Creativity
- Originality
- Pro-activeness
- Initiatives
- Cost Effectiveness
- Resourcefulness
- Development of soft skills/generic skills

There may be deviation from planning, design and implementation of the project as per the requirement.

2.2.3 Quality of Report Writing :

Following points need to be taken care of for report writing-

- Report writing as per prescribed format
- Clarity of Objectives
- Presentation of Data
- Data Analysis, Interpretation and Result
- Quality of Product

2.2.4 Presentation & Discussion :

Quality of presentation of data need to be ensured using the following criteria -

- Clarity in Communication and Presentation
- Voice Audibility
- Use of Media and methods
- Satisfying the queries of audience
- Attainment of objectives set

2.2.5 Project's Potential :

Futuristic scope and recommendation for further studies related to project may be assessed from the following criteria -

- Papers published or award received
- Exhibition or Display or showcase of project in competition or exhibition or Tech Fest
- Evaluation of working of projects or prototype
- Relevance and Applications in the world of work
- Recognition in any form
- Related areas/sub areas for further studies

The students need to be assessed continuously based on the assessment rubric prepared by the implementing teachers on different stages of project work completion.