DIPLOMA IN ENGINEERING AND TECHNOLOGY

1122

DEPARTMENT OF FIRE TECHNOLOGY AND SAFETY

SEMESTER PATTREN

N – SCHEME

IMPLEMENTED FROM 2020-2021

CURRICULUM DEVELOPMENT CENTRE

DIRECTORATE OF TECHNICAL EDUCATION

CHENNAI-600 025, TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS (II / III YEAR)

N Scheme

(Implemented from Academic Year 2021-22)

Chairperson

Tmt. G.Laxmi Priya, I.A.S

Director, Directorate of Technical Education, Chennai-25

Coordinator

Tmt. V.Thenmozhi,

Principal, Govt. Polytechnic College, Karur- 621 301.

DIPLOMA IN FIRE TECHNOLOGY AND SAFETY (1122)	
Convener **Dr.N.Thangavelu M.E., Ph.D.,** PRINCIPAL Sakthi Polytechnic College, Sakthi Nagar- 638315 9443346216, Email.id: erthangavelu11@gmail.com	
Members	
Thiru.M.Palanisamy B.E., B.O.E., M.E (ISE)., Safety officer, Sakthi Sugars Ltd, Sakthi nagar-638315. Erode District, Mobile Number: 9865844474	**Thiru V.P.Thangavel B.E., M.Sc (Env.Sci) D.I.S.,** Senior Manager (Safety), Sakthi Auto Component Ltd., Thiruppur, Mobile Number: 94442639221
Dr.N.M.Sivaram, B.E., M.Tech., Ph.D., Assistant Professor, Department of Mechanical Engineering, National Institute of Technology, Puducherry, Karaikal-609609. Mobile Number:9994448289	**Dr.K.Ramamoorthy,** Director, Institute of Industrial Fire and Safety Engineering, Coimbatore, Mobile Number: 9578495909, 9047449255
Thiru. J.R.Karthickraja M.E., Vice Principal, The Kavery Polytechnic College, Mecheri, Mettur- 636453. Salem District. Mobile Number: 9524995156.	

For Director of Technical Education

DIPLOMA COURSE IN ENGINEERING/TECHNOLOGY

(SEMESTER SYSTEM)

(Implemented from 2020 -2021)

N – SCHEME

R E G U L A T I O N S*

***Applicable to the Diploma Courses other than Diploma in Hotel Management Catering Technology.*

1. Description of the Course:

a. Full Time (3 years)

The Course for the Full Time Diploma in Engineering shall extend over a period of three academic years, consisting of 6 semesters* and the First Year is common to all Engineering Branches.

b. Sandwich (3½ years)

The Course for the Sandwich Diploma in Engineering shall extend over a period of three and half academic years, consisting of 7 semesters* and the First Year is common to all Engineering Branches. The subjects of three years full time diploma course being regrouped for academic convenience.

During 4thand/or during 7thsemester the students undergo industrial training for six months/ one year. Industrial training examination will be conducted after completion of every 6 months of industrial training.

c. Part Time (4 years)

The course for the Part Time Diploma in Engineering shall extend over a period of 4 academic years containing of 8 semesters*, the subjects of 3 year full time diploma courses being regrouped for academic convenience.

**** Each Semester will have 16 weeks duration of study with 35 hrs. / Week for Regular Diploma Course and 18 hrs. / Week for Part-Time Diploma Course.***

The Curriculum for all the 6 Semesters of Diploma courses (Engineering & Special Diploma Courses. Textile Technology, Leather Technology, Printing Technology, Chemical Technology etc.) Have been revised and revised curriculum is applicable for the candidates admitted from 2020 – 2021 academic year onwards.

2. Condition for Admission:

Condition for admission to the Diploma courses shall be required to have passed in The S.S.L.C Examination of the Board of Secondary Education, Tamil Nadu.

(Or)

The Anglo Indian High School Examination with eligibility for Higher Secondary Course in Tamil Nadu.

(Or)

The Matriculation Examination of Tamil Nadu.

(Or)

Any other Examinations recognized as equivalent to the above by the Board of Secondary Education, Tamil Nadu.

Note: In addition, at the time of admission the candidate will have to satisfy certain minimum requirements, which may be prescribed from time to time.

3. Admission to Second year (Lateral Entry):

A pass in HSC (academic) or (vocational) courses mentioned in the Higher Secondary Schools in Tamil Nadu affiliated to the Tamil Nadu Higher Secondary Board with eligibility for university Courses of study or equivalent examination& Should have studied the following subjects.

A pass in 2 Years ITI with appropriate Trade or Equivalent examination.

Sl. No	Courses	H.Sc Academic	H.Sc Vocational		Industrial Training Institutes Courses
		Subjects Studied	Subjects Studied		
			Related subjects	Vocational subjects	
1.	All the Regular and Sandwich Diploma Courses	Physics and Chemistry as compulsory along with Mathematics / Biology	Maths / Physics / Chemistry	Related Vocational Subjects Theory& Practical	2 years course to be passed with appropriate Trade
2.	Diploma Course in Modern Office Practice	English & Accountancy English & Elements of Economics English & Elements of Commerce	English & Accountancy, English & Elements of Economics, English & Management Principles & Techniques, English & Typewriting	Accountancy & Auditing, Banking, Business Management, Co-operative Management, International Trade, Marketing & Salesmanship, Insurance& Material Management, Office Secretary ship.	

- For the Diploma Courses related with Engineering/Technology, the related / equivalent subjects prescribed along with Practical's may also be taken for arriving the eligibility.
- Branch will be allotted according to merit through counseling by the respective Principal as per communal reservation.
- For admission to the Textile Technology, Leather Technology, Printing Technology, Chemical Technology and Modern Office Practice Diploma courses the candidates studied the related subjects will be given first preference.
- *Candidates who have studied Commerce Subjects are not eligible for Engineering Diploma Courses.*

4. Age Limit: **No Age limit.**

5. Medium of Instruction: English

6. Eligibility for the Award of Diploma:

No candidate shall be eligible for the Diploma unless he/she has undergone the prescribed course of study for a period of not less than 3 academic years in any institution affiliated to the State Board of Technical Education and Training, Tamil Nadu, when joined in First Year and two years if joined under Lateral Entry scheme in the second year and passed the prescribed examination.

The minimum and maximum period for completion of Diploma Courses are as given below:

Diploma Course	Minimum Period	Maximum Period
Full Time	3 Years	6 Years
Full Time (Lateral Entry)	2 Years	5 Years
Sandwich	3½ Years	6½ Years
Part Time	4 Years	7 Years

This will come into effect from N Scheme onwards i.e. from the academic year 2020-2021.

Subjects of Study and Curriculum outline:

The subjects of study shall be in accordance with the syllabus prescribed from time to time, both in theory and practical subjects.

The curriculum outline is given in Annexure– I.

7. Examinations:

Board Examinations in all subjects of all the semesters under the scheme of examinations will be conducted at the end of each semester.

The internal assessment marks for all the subjects will be awarded on the basis of continuous internal assessment earned during the semester concerned. For each subject 25 marks are allotted for internal assessment. Board Examinations are conducted for 100 marks and reduced to 75.

The total marks for result are 75 + 25 = 100 Marks.

8. Continuous Internal Assessment:

A. For Theory Subjects:

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

i) Subject Attendance **5 Marks**

(Award of marks for subject attendance to each subject Theory/Practical will be as per the range given below)

80%	-	83%	1 Mark
84%	-	87%	2 Marks
88%	-	91%	3 Marks
92%	-	95%	4 Marks
96%	-	100%	5 Marks

ii) Test **10 Marks**

2 Tests each of 2 hours duration for a total of 50 marks are to be conducted. Average of the these two test marks will be taken and the marks to be reduced to:	**05 Marks**
The Test – III is to be the Model Examination covering all the five units and the marks obtained will be reduced to:	**05 Marks**

TEST	UNITS	WHEN TO CONDUCT	MARKS	DURATION
Test I	Unit – I & II	End of 6th week	50	2 Hrs
Test II	Unit – III & IV	End of 12th week	50	2 Hrs
Test III	**Model Examination:** Covering all the 5 Units. (Board Examinations-question paper-pattern).	End of 16th week	100	3 Hrs

From the Academic Year 2020 – 2021 onwards.

Question Paper Pattern for the Test -I and Test–II is as follows. The tests should be conducted by proper schedule. Retest marks should not be considered for internal assessment.

Without Choice:

Part A Type questions:	6 Questions ×1 mark	06 marks
Part B Type questions:	7Questions ×2marks	14 marks
Part C Type questions:	2 Questions ×15 marks	30 marks
	Total	**50 marks**

iii) Assignment **5 Marks**

For each subject Three Assignments are to be given each for 20 marks and the average marks scored should be reduced for 5 marks.

iv) Seminar Presentation **5 Marks**

The students have to select the topics either from their subjects or general subjects which will help to improve their grasping capacity as well as their capacity to express the subject in hand. The students will be allowed to prepare the material for the given topic using the library hour and they will be permitted to present seminar (For First and Second Year, the students will be permitted to present the seminar as a group not exceeding six members and each member of the group should participate in the presentation. For the Third Year, the students should present the seminar

individually.) The seminar presentation is mandatory for all theory subjects and carries 5 marks for each theory subject. The respective subject faculty may suggest topics to the students and will evaluate the submitted materials and seminar presentation. (2½ marks for the material submitted in writing and 2 ½ marks for the seminar presentation). For each subject minimum of two seminars are to be given and the average marks scored should be reduced to 5 marks.

All Test Papers, Assignment Papers / Notebooks and the seminar presentation written material after getting the signature with date from the students must be kept in safe custody in the department for verification and audit. It should be preserved for one semester after publication of Board Exam results and produced to the flying squad and the inspection team at the time of inspection/verification.

B. For Practical Subjects:

The Internal Assessment mark for a total of 25 marks which are to be distributed as follows:-

a) Attendance :**5Marks**

(Award of marks same as theory subjects)

b) Procedure/ observation and tabulation/
Other Practical related Work : **10Marks**

c) Record writing : **10Marks**

TOTAL : **25Marks**

- *All the Experiments/Exercises indicated in the syllabus should be completed and the same to be given for final Board examinations.*
- The observation note book / manual should be maintained for 10 marks. The observation note book / manual with sketches, circuits, programme, reading and calculation written by the students manually depends upon the practical subject during practical classes should be evaluated properly during the practical class hours with date.
- The Record work for every completed exercise should be submitted in the subsequent practical classes and marks should be awarded for 10 marks for each exercise as per the above allocation.
- At the end of the Semester, the average marks of all the exercises should be calculated for 20 marks (including Observation and Record writing) and the marks awarded for attendance is to be added to arrive at the internal assessment mark for Practical. (20+5=25 marks)

- Only regular students, appearing first time have to submit the duly signed bonafide record note book/file during the Practical Board Examinations.

All the marks awarded for Assignments, Tests, Seminar presentation and Attendance should be entered periodically in the Personal Theory Log Book of the staff, who is handling the theory subject.

The marks awarded for Observation, Record work and Attendance should be entered periodically in the Personal Practical Log Book of the staff, who is handling the practical subject.

9. Communication Skill Practical, Computer Application Practical and Physical Education:

The Communication Skill Practical and Computer Application Practical with more emphasis are being introduced in First Year. Much Stress is given to increase the Communication skill and ICT skill of students.

As per the recommendation of MHRD and under Fit India scheme, the Physical education is introduced to encourage students to remain healthy and fit by including physical activities and sports.

10. Project Work and Internship:

The students of all the Diploma Courses have to do a Project Work as part of the Curriculum and in partial fulfillment for the award of Diploma by the State Board of Technical Education and Training, Tamil Nadu. In order to encourage students to do worthwhile and innovative projects, every year prizes are awarded for the best three projects i.e. institution wise, region wise and state wise. **The Project work must be reviewed twice in the same semester. The project work is approved during the V semester by the properly constituted committee with guidelines.**

a) Internal assessment mark for Project Work &Internship:

Project Review I	…	**10 marks**
Project Review II	…	**10 marks**
Attendance	…	**05 marks** (Award of marks same as theory subject pattern)
Total	…	**25 marks**

Proper record should be maintained for the two Project Reviews and preserved for one semester after the publication of Board Exams results. It should be produced to the flying squad and the inspection team at the time of inspection/verification.

b) Allocation of Marks for Project Work &Internship in Board Examinations:

Demonstration/Presentation	25 marks
Report	25 marks
Viva Voce	30 marks
Internship Report	20 marks
Total	**100* marks**

*Examination will be conducted for 100 marks and will be converted to 75 marks.

c) Internship Report:

The internship training for a period of two weeks shall be undergone by every candidate at the end of IV / V semester during vacation. The certificate shall be produced along with the internship report for evaluation. The evaluation of internship training shall be done along with final year "Project Work & Internship" for 20 marks. The internship shall be undertaken in any industry / Government or Private certified agencies which are in social sector / Govt. Skill Centers / Institutions / Schemes.

A neatly prepared PROJECT REPORT as per the format has to be submitted by individual student during the Project Work &Internship Board examination.

11. Scheme of Examinations:

The Scheme of examinations for subjects is given in Annexure - II.

12. Criteria for Pass:

1. No candidate shall be eligible for the award of Diploma unless he/she has undergone the prescribed course of study successfully in an institution approved by AICTE and affiliated to the State Board of Technical Education & Training, Tamil Nadu and pass all the subjects prescribed in the curriculum.
2. A candidate shall be declared to have passed the examination in a subject if he/she secures not less than *40% in theory subjects* and *50% in practical subjects* out of the total prescribed maximum marks including both the Internal Assessment and the Board Examinations marks put together, subject to the condition that he/she secures at least a minimum of 4*0 marks out of 100 marks in the Board Theory Examinations and a minimum of 50 marks out of 100 marks in the Board Practical Examinations.*

13. Classification of successful candidates:

Classification of candidates who will pass out the final examinations from April 2023 onwards (Joined first year in 2020 -2021) will be done as specified below.

First Class with Superlative Distinction:

A candidate will be declared to have passed in **First Class with Superlative Distinction** if he/she secures not less than 75% of the marks in all the subjects and passes all the semesters in the first appearance itself and passes all subjects within the stipulated period of study 2 / 3/ 3½/ 4 years [Full Time (lateral entry)/Full Time/Sandwich/Part Time] without any break in study.

First Class with Distinction:

A candidate will be declared to have passed in **First Class with Distinction** if he/she secures not less than 75% of the aggregate marks in all the semesters put together and passes all the semesters except the I and II semester in the first appearance itself and passes all subjects within the stipulated period of study 2 / 3 / 3½ / 4 years [Full time (lateral entry)/Full Time/Sandwich/Part Time] without any break in study.

First Class:

A candidate will be declared to have passed in **First Class** if he/she secures not less than 60% of the aggregate marks in all the semesters put together and passes all the subjects within the stipulated period of study 2 / 3 / 3½ / 4 years [Full time(lateral entry)/Full Time/Sandwich/Part Time] without any break in study.

Second Class:

All other successful candidates will be declared to have passed in **Second Class.**

The above classifications are also applicable for the Sandwich / Part-Time students who pass out Final Examination from October 2023 /April 2024 onwards (both joined First Year in 2020 -2021)

14. Duration of a period in the Class Time Table:

The duration of each period of instruction is1 hour and the total period of instruction hours excluding interval and lunch break in a day should be uniformly maintained as 7 hours corresponding to 7 periods of instruction (Theory & Practical).

ANNEXURE – I

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN FIRE TECHNOLOGY AND SAFETY SYLLABUS

N – SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

CURRICULUM OUTLINE

THIRD SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory hours	Drawing hours	Practical hours	Total hours
42931	Industrial Safety Engineering	5	-	-	5
42932	Fire Engineering	5	-	-	5
42933	Safety Management	5	-	-	5
42934	Basic First AID	5	-	-	5
42935	Safety Engineering Practical	-	-	4	4
42936	First AID Practical	-	-	4	4
42937	Personal Protective Equipment practical	-	-	4	4
		20	-	-	32
Extra / Co-Curricular activities					
	Library	-	-	-	1
	Physical Education	-	-	-	2
TOTAL					**35**

FOURTH SEMESTER

subject code	SUBJECT	HOURS PER WEEK			
		Theory hours	Drawing hours	Practical hours	Total hours
42941	Electrical Safety	5	-	-	5
42942	Fire Control Technology	5	-	-	5
42943	Explosion Theory and Control	5	-	-	5
42944	Occupational Health and Safety	5	-	-	5
42945	Electrical Safety Practical	-	-	4	4
42946	Fire Safety and Fighting Practical	-	-	4	4
42947	Industrial Hygiene Practical	-	-	4	4
		16		16	32
Extra / Co-Curricular activities					

Library	-	-	-	1
Physical Education	-	-	-	2
TOTAL				**35**

FIFTH SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory hours	Drawing hours	Practical hours	Total hours
42951	Hazard Identification and Risk Management	6	-	-	6
42952	Environmental Safety	5	-	-	5
Elective I Theory					
42971	**a) Safety in Engineering Industries**	5	-	-	5
42972	**b) Safety in Process Industries And Powder Handling**		-	-	
42973	**c) Safety in Oil And Gas Industries**		-	-	
42954	Hazard Identification Practical	-	-	4	4
42955	Computer Aided Risk Analysis Practical	-	-	4	4
Elective I Practical					
42974	**a) Manufacturing Safety Practical**	-	-	4	4
42975	**b) Chemical Safety Practical**	-	-		
42976	**c) Environmental Safety Practical**	-	-		
42977	Entrepreneurship and Startup practical			4	4
		16	-	16	32
Extra / Co-Curricular activities					
	Library	-	-	-	1
	Physical Education	-	-	-	2
	TOTAL				**35**

SIXTH SEMESTER

<table>
<tr><th rowspan="2">Subject Code</th><th rowspan="2">SUBJECT</th><th colspan="4">HOURS PER WEEK</th></tr>
<tr><th>Theory hours</th><th>Drawing hours</th><th>Practical hours</th><th>Total hours</th></tr>
<tr><td>42961</td><td>Regulations for Safety, Health and Environment</td><td>6</td><td>-</td><td>-</td><td>6</td></tr>
<tr><td>42962</td><td>Disaster Management</td><td>5</td><td>-</td><td>-</td><td>5</td></tr>
<tr><td colspan="6">Elective II Theory</td></tr>
<tr><td>42981</td><td>a) Safety in Material Handling</td><td rowspan="3">5</td><td>-</td><td>-</td><td rowspan="3">5</td></tr>
<tr><td>42982</td><td>b) Safety In Construction And Textile Industry</td><td>-</td><td>-</td></tr>
<tr><td>42983</td><td>c) Transport and Mine Safety</td><td>-</td><td>-</td></tr>
<tr><td>42963</td><td>Safety and Regulations Audit practical</td><td>-</td><td>-</td><td>6</td><td>6</td></tr>
<tr><td colspan="6">Elective II Practical</td></tr>
<tr><td>42984</td><td>a) Construction and Material Handling Safety Practical</td><td>-</td><td>-</td><td rowspan="3">5</td><td rowspan="3">5</td></tr>
<tr><td>42985</td><td>b) Transport and Road Safety Practical</td><td>-</td><td>-</td></tr>
<tr><td>42986</td><td>c) Emergency Preparedness Practical</td><td>-</td><td>-</td></tr>
<tr><td>42964</td><td>Project Work and Internship</td><td>-</td><td>-</td><td>5</td><td>5</td></tr>
<tr><td colspan="2"></td><td>-</td><td>-</td><td>-</td><td>32</td></tr>
<tr><td colspan="6">Extra / Co-Curricular activities</td></tr>
<tr><td colspan="2">Library</td><td>-</td><td>-</td><td>-</td><td>1</td></tr>
<tr><td colspan="2">Physical Education</td><td>-</td><td>-</td><td>-</td><td>2</td></tr>
<tr><td colspan="5">TOTAL</td><td>35</td></tr>
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ANNEXURE – II

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN FIRE TECHNOLOGY AND SAFETY SYLLABUS

N – SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

SCHEME OF EXAMINATION

THIRD SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			Minimum for pass	Duration of Exam Hours
		Internal Assessment	Board Examination	Total		
42931	Industrial Safety Engineering	25	100*	100	40	3
42932	Fire Engineering	25	100*	100	40	3
42933	Safety Management	25	100*	100	40	3
42934	Basic First AID	25	100*	100	50	3
42935	Safety Engineering Practical	25	100*	100	50	3
42936	First AID Practical	25	100*	100	50	3
42937	Personal Protective Equipment practical	25	100*	100	50	3

*** Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

FOURTH SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			Minimum for pass	Duration of Exam Hours
		Internal Assessment	Board Examination	Total		
42941	Electrical Safety	25	100*	100	40	3
42942	Fire Control Technology	25	100*	100	40	3
42943	Explosion Theory and Control	25	100*	100	40	3
42944	Occupational Health and Safety	25	100*	100	50	3
42945	Electrical Safety Practical	25	100*	100	50	3
42946	Fire Safety and Fighting Practical	25	100*	100	50	3

42947	Industrial Hygiene Practical	25	100*	100	50	3

*** Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

FIFTH SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			Minimum for pass	Duration of Exam Hours
		Internal Assessment	Board Examination	Total		
42951	Hazard Identification and Risk Management	25	100*	100	40	3
42952	Environmental Safety	25	100*	100	40	3
Elective Theory - I						
42971	a) Safety in Engineering Industries	25	100*	100	40	3
42972	b) Safety in Process Industries And Powder Handling					
42973	c) Safety in Oil And Gas Industries					
42954	Hazard Identification Practical	25	100*	100	50	3
42955	Computer Aided Risk Analysis Practical	25	100*	100	50	3
Elective Practical - I						
42974	a) Manufacturing Safety Practical	25	100*	100	50	3
42975	b) Chemical Safety Practical					
42976	c) Environmental Safety Practical					
42977	Entrepreneurship and Startup practical	25	100*	100	50	3

*** Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

SIXTH SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			Minimum for pass	Duration of Exam Hours
		Internal Assessment	Board Examination	Total		
42961	Regulations for Safety, Health and Environment	25	100*	100	40	3
42962	Disaster Management	25	100*	100	40	3
Elective Theory - II						
42981	a) Safety in Material Handling	25	100*	100	40	3
42982	b) Safety In Construction And Textile Industry					
42983	c) Transport and Mine Safety					
42963	Safety and Regulations Audit practical	25	100*	100	40	3
Elective Practical - II						
42984	a) Construction and Material Handling Safety Practical	25	100*	100	50	3
42985	b) Transport and Road Safety Practical					
42986	c) Emergency Preparedness Practical					
42964	Project Work and Internship	25	100*	100	50	3

*** Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42931

Semester : III

Subject title : Industrial Safety Engineering

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester: 16 Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
Industrial safety Engineering	**5**	**80**	**25**	**100***	**100**	**3 Hrs**

***Examination will be conducted for 100 marks and it will be reduced to 75 marks**

Topics and Allocation of Hours

unit	Topics	Hrs
I	Safety in Engineering Industry	15
II	Plant Location & layout	15
III	Working Conditions	15
IV	Personal Protection	15
V	Factories Act-1948	13
	Test and Model Exam	07
	total	80

RATIONALE:

Industrial safety is needed to check all the possible chances of accidents for preventing loss of life, permanent disability of industrial employee and damage to machine and materials. It is needed to eliminate accidents causing work stoppage and production loss.

OBJECTIVES:

- To explain about the general safety rules and principles.
- To inspections about the basic machines.
- To explain the construction of plant layouts.
- To describe the industry working conditions.
- To understand the personal protection details.
- To know the factories acts.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**SAFETY IN ENGINEERING INDUSTRY** **General safety** Rules-Principles – inspections of turning machine, boring machines, milling machine, planning machine and grinding machines, CNC machines.	5
	Welding Gas welding and oxygen cutting, resistances welding, arc welding and cutting, common hazards, personal protective equipment.	5
	Foundry Hot working safety in forging, hot rolling mill operation, safety in gas furnace operations, cupola, Crucibles, ovens, foundry health hazards.	5
II	**PLANT LOCATION & LAYOUT** **Plant Location** Selection of plant locations- territorial parameters, considers of land, water, electricity- location for waste treatment and disposal, further, expansions.	7
	safe layout Equipment layout- safety system- fire hydrant locations- fire service rooms- facilities for safe effluent disposal and treatment tank, site considerations, approach roads, Plant railway lines, security towers.	8

III	**WORKING CONDITIONS**	
	3.1 Ventilation Principles of good ventilation- purpose- physiological and comfort level types, local and exhaust ventilation, hood and duct design, air conditioning- application- purpose of lighting- and advantages of good illumination- glare and effect.	8
	3.3 work standard Requirement for Various work, standards, housekeeping, principles of 5"S".	7
IV	**PERSONAL PROTECTION**	
	Personal Protective Equipments Concepts of personal protective equipment- types- selection of PPE- invisible protective barriers- procurement, storage,	8
	Inspection & Standards Inspection and testing- quality- standards- ergonomic considerations in personal Protective equipment design.	7
V	**FACTORIES ACT-1948** Statutory authorities- Inspecting staff health- safety, provisions relating to hazardous processes, welfare, working hours, employment of young person's- special provisions- penalties and procedures- tamilnadu factories Rules 1950 under safety and health chapters of Factories Act 1948- schedules of factories Act.	13

Reference Books:

1. Accident Prevention Manual for Industrial Operations, NSC Chicago, 1982.
2. The Factories Act 1948, madras Book Agency, Chennai, 2000.
3. Hunter, Gomas, “Engineering design for safety” MC Graw Hill Inc, 1992.
4. “Occupational Safety Manual” BHEL, Trichy, 1988.
5. “Safety management by John V.Grimaladi and Rohillin H.Symonds, All India Travelers book Seller, New Delhi1989.
6. “Safety in Industry: N.V. Krishnan Jaico Publishers House1996.
7. Health & Safety in welding and applied processes. Welding institute, UK, High Tech publishing Ltd, London 1989.
8. APPLE M.JAMES “Plant layout and material handling” 3rd Edition, John Wiley & sons.
9. ISO 9000 to OSHAS 18001, Dr.K.C.Arora, S.K.Kataria & sons, Delhi.

Board Examination Question Paper Pattern

Time: 3 Hrs

Max.Marks: 100

PART -A Five question will be asked covering all units. All questions are to be answered. Each question carries 1 mark.

PART-B Fifteen questions will be asked covering all the units. Three question from each unit. Answer any ten questions. Each question carries 2marks.

PART-C Five questions will be asked either or type. One question from every unit. Answer either A or B. Each question carries 15 marks. A and B have subdivisions (7+8).

The questions are to be numbered from 1 to 25. All the units are to be covered with equal weight age.

PART A Definitions and statements Question Number 1 to 5	5x1=5 Marks
PART B Short answer questions Question Number 6 to 20	10x2=20 Marks
PART C Descriptive answer type questions (Either A or B) Question Number 21 to 25	5x15=75 Marks
TOTAL	100 Marks

Note: Board Examinations will be Conducted for 100 Marks and converted to 75 Marks.

MODEL QUESTION PAPER

42931-INDUSTRIAL SAFETY ENGINEERING

Time: 3 Hrs **Max Marks:** 100

PART-A

5 x 1 = 5

Answer all the Questions. Each Question Carries One Mark

1. What are the safety rules?
2. Define safe layout.
3. Define good ventilation.
4. What is the term of PPE?
5. What is industrial health?

PART-B

10 x 2 = 20

Answer any TEN Questions. Each Questions Carries two Marks

6. State the principle inspection of turning machine.
7. List out the personal protective equipment.
8. Briefly explain gas furnace operations. .
9. State selection of plant locations.
10. Define waste treatment.
11. Define security towers.
12. Sketch and briefly explain air conditioning.
13. What are the advantages of good light illumination?
14. Define 5'S?
15. What are the concepts of PPE?
16. List out the PPE quality standards.
17. Define Ergonomics?
18. State hazardous processes in factory.
19. What are the special provisions given in industry persons?
20. Define industry penalties and procedures?

PART-C

5 x 15 = 75

Answer all questions.

21. A. Explain the inspection methods of CNC machines and Gas welding machines.

(OR)

B Explain the following hot working safety procedures.

i. Cupola furnaces

ii. Hot ovens

22. A. Briefly explain about the selection of plant location parameters.

(OR)

B. (i) Explain about the fire hydrant locations in industry. (7)

(ii) Briefly explain Effluent disposal and treatment. (8)

23. A. (i) What are the psychological parameters considering in industry working conditions?(8)

(ii) List out the ventilation standards in industry. (7)

(OR)

B. Explain the important housekeeping standards in industry.

24. A. Explain about the inspection and testing methods of PPE.

(OR)

B. What are the design considerations in PPE?

. Illustrates about the employment welfare authorities.

(OR)

B. Explain the points to be considered for safety and health in industries as per the Factories Act, 1948.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42932

Semesters III

Subject title : Fire Engineering

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester: 16 Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
Fire Engineering	**5**	**80**	**25**	**100***	**100**	**3 Hrs**

***Examination will be conducted for 100 marks and it will be reduced to 75 marks**

Topics and Allocation of Hours

unit	Topics	Hrs
I	Anatomy of fire and case studies	15
II	Basic chemistry and physics of fire	15
III	Fire prevention and protection	15
IV	Industrial fire protection systems	15
V	Common and special hazards	13
	Test and Model Exam	07
	total	80

RATIONALE:

All over the world services of a Fire Engineer are considered among top-notch professions as it plays a significant role in saving life and property which is why it is considered as one of the hot career options in academics.

OBJECTIVES:

- To explain about the basics of physics and chemistry of fire.
- To understand properties of physics and chemistry of fire.
- To describe the Fire prevention and protection.
- .To learn about the Industrial fire protection systems.
- To understand about the fire hazards systems.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**ANATOMY OF FIRE** **Anatomy of fire** Fire properties of solid, liquid and gases - fire spread - toxicity of products of combustion - theory of combustion and explosion – vapour clouds – flash fire – jet fires – pool fires – unconfined vapour cloud explosion, shock waves - auto-ignition – boiling liquid expanding vapour explosion – **case studies** Flixborough, Mexico disaster, Pasedena Texas, Piper Alpha, Peterborough and Bombay Victoria dock ship Explosions.	10 5
II	**Basic chemistry and physics of fire** Atomic structure-Elements, compounds-Pure substance and mixture-Physical and chemical changes-Condition for the changes-Energy changes-Effects of heat on matter-Combustion-Temperature-Specific heat capacity-Catalyst-Neutralization-Sublimation-Heat of decomposing-Chemical reaction-Exothermic reaction and endothermic reaction-Transmission of heat-Flash and fire point-Ignition temperature.	15

III	**FIRE PREVENTION AND PROTECTION** **3.1 Fire Source** Sources of ignition – fire triangle – principles of fire extinguishing – active and passive fire protection systems – various classes of fires – A, B, C, D, E.	5
	3.2 Protection Types of fire extinguishers – fire stoppers – hydrant pipes – hoses – monitors – fire watchers – layout of stand pipes – fire station- fire alarms and sirens – maintenance of fire trucks – foam generators – Escape from fire rescue operations – fire drills – notice-first aid for burns.	10
IV	**INDUSTRIAL FIRE PROTECTION SYSTEMS** **4.1 Protection systems** Sprinkler-hydrants-stand pipes – special fire suppression systems like deluge and emulsifier, selection criteria of the above installations, reliability, maintenance, evaluation and standards-alarm and detection systems. Other suppression systems – CO2 system, foam system, dry chemical powder (DCP) system, halon system – need for halon replacement – smoke venting. Portable extinguishers – flammable liquids – tank farms – indices of inflammability-fire fighting systems.	10
	4.2 Building fire safety Objectives of fire safe building design, Fire load, fire resistant material and fire testing – structural fire protection – structural integrity – concept of egress design - exist – width calculations – fire Certificates – fire safety requirements for high rise buildings –snookers.	5
V	**Common and special hazards** Electricity as an Ignition Source – Hazardous Locations and National Electric Code – Safe Design of Electrical Equipment – National Testing Laboratory – Flammable Liquids and Combustible Liquids – Upper and Lower Explosive Limits – Flammable and Combustible Liquid Storage – Containers and Portable Tanks – Transfer of Flammable and Combustible Liquids – Storage Cabinets – Storage Tanks – Above Ground Tanks – Under Ground Tanks – Tanker Loading and Unloading – Hydrogen – Acetylene – Oxygen – LPG.	13

Reference Books:

1. “Fundamentals of Fire Protection for the Safety Professional”, Lon H. Ferguson,
2. Christopher A. Janicak, Government Institutes, Scarecrow Press.
3. “Industrial Fire Protection Engineering”, Robert G. Zalosh, john Wiley Publications.
4. Fire Protection Hand Book Publication: National Fire Protection Association USA,
5. Author: Quincy – Massachusetts 20.Fire and explosion Hazards Handbook of Industrial Chemicals Publication: Jaico Publishing House, Author: Tatyana Devletshina & Nicholas P. Cheremisinoff, Ph. D.Electrical Safety,

Board Examination Question Paper Pattern

Time: 3 Hrs

Max.Marks: 100

PART -A Five question will be asked covering all units. All questions are to be answered. Each question carries 1 mark.

PART-B Fifteen questions will be asked covering all the units. Three question from each unit. Answer any ten questions. Each question carries 2marks.

PART-C Five questions will be asked either or type. One question from every unit. Answer either A or B. Each question carries 15 marks. A and B have subdivisions (7+8).

The questions are to be numbered from 1 to 25. All the units are to be covered with equal weight age.

PART A Definitions and statements Question Number 1 to 5	5x1=5 Marks
PART B Short answer questions Question Number 6 to 20	10x2=20 Marks
PART C Descriptive answer type questions (Either A or B) Question Number 21 to 25	5x15=75 Marks
TOTAL	100 Marks

Note: Board Examinations will be Conducted for 100 Marks and converted to 75 Marks.

MODEL QUESTION PAPER

42932- FIRE ENGINEERING

Time: 3 Hrs **Max Marks:** 100

PART – A

5 x 1 = 5

Answer all questions. Each question carries one mark.

1. What are properties of fire?
2. Define ignition temperature.
3. List out classes of fires.
4. What is term of DCP?
5. List out flammable liquids.

PART – B

10 x 2 = 20

Answer any TEN Questions. Each Questions Carries two Marks

6. State the cause's of fire spread.
7. Define theory of fire combustion.
8. What are case studies of fire?
9. State Atomic structure of fire.
10. Define catalyst of fire.
11. What is flash and fire point?
12. Briefly explain fire sources.
13. List out the types of fire extinguishers.
14. Define fire drills?
15. Define CO_2 system?
16. How to farm flammable tanks?
17. What are the objectives of fire safety building?
18. State national Electrical codes.
19. State upper and lower Explosive limits.
20. Briefly explain storage liquid cabinets.

PART – C

5 x 15 = 75

Answer ALL Questions.

21. A. Explain the various types of fire explosion concepts.

(OR)

B Explain how to control Expanding vapour explosions.

22. A. Give a brief account of conditions for fire changes.

(OR)

B. (i) Explain about the fire exothermic reaction. (8)

(ii) Explain about the fire endothermic reaction. (7)

23. A. illustrates about the fire classes. What kind of fire extinguishers to be used particulars?

(OR)

B. (i) Sketch and explain layouts of fire stoppers. (8)

(ii) Briefly explain about the fire rescue operations. (7)

24. A. Explain about the selection criteria of fire production systems.

(OR)

B. Explain the fire resistance materials in detail and fire testing methods.

. illustrates about the safety design methods of electrical equipment.

(OR)

B. (i) Differentiate between the fluid Ground tanks and underground tanks. (8)

(ii)What are methods used in loading and unloading different fluids. (7)

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42933

Semester : III

Subject title : Safety Management

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester: 16 Weeks

Subject	Instructions		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
Safety Management	**5**	**80**	**25**	**100***	**100**	**3 Hrs**

***Examination will be conducted for 100 marks and it will be reduced to 75 marks**

Topics and Allocation of Hours

unit	Topics	Hrs
I	Concepts	15
II	Techniques	15
III	Accident investigation and reporting	15
IV	Safety performance monitoring	15
V	Safety education and training	13
	Test and Model Exam	07
	total	80

RATIONALE:

To provide a structured management approach to control safety risks in operations. Effective safety management must take into account the organization's specific structures and processes related to safety of operations.

OBJECTIVES:

- To understand the safety planning and policies.
- To explain about the safety techniques.
- To learn about the accident investigation and reporting methods.
- To apply and understand safety performance monitoring.
- To understand the safety education and training methods.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**CONCEPTS** History of Safety movement –evolution of modern safety concept- general concepts of management – planning for safety for optimization of productivity, line and staff functions for safety- budgeting for safety- safety policy.	15
II	**TECHNIQUES** Incident Recall Technique (IRT), disaster control, job safety Analysis, safety survey, safety inspection, safety sampling and Safety audit.	15
III	**ACCIDENT INVESTIGATION AND REPORTING** Concept of an accident, reportable and non reportable accidents, reporting to statutory authorities– principles of accident prevention – accident investigation and analysis – records for accidents, departmental accident reports, documentation of accidents – unsafe act and condition – domino sequence – supervisory role – role of safety committee –cost of accident.	15
IV	**SAFETY PERFORMANCE MONITORING** ANSI (Z16.1) Recommended Practices for compiling and measuring work injury experience – permanent total disabilities, permanent partial disabilities, temporary total disabilities. Calculation of accident indices, frequency rate, severity rate, frequency severity incidence, incident rate, accident rate, safety “t” score, safety activity rate- problems.	15

V	**SAFETY EDUCATION AND TRAINING** Importance of training-identification of training needs-training methods – programmes, seminars, conferences, competitions – method of promoting safe practice - motivation – communication - role of government agencies and private consulting agencies in safety training– creating awareness, awards, celebrations, safety posters, safety displays, safety pledge, safety incentive scheme, safety campaign – Domestic Safety and Training.	13

Reference Books:

1. Accident Prevention Manual for Industrial Operations", N.S.C.Chicago, 1982
2. Heinrich H.W. "Industrial Accident Prevention" McGraw-Hill Company, New York, 1980.
3. Krishnan N.V. "Safety Management in Industry" Jaico Publishing House, Bombay, 1997.
4. John Ridley, "Safety at Work", Butterworth & Co., London, 1983.
5. Blake R.B., "Industrial Safety" Prentice Hall, Inc., New Jersey, 1973

Board Examination Question Paper Pattern

Time: 3 Hrs

Max.Marks: 100

PART -A Five question will be asked covering all units. All questions are to be answered. Each question carries 1 mark.

PART-B Fifteen questions will be asked covering all the units. Three question from each unit. Answer any ten questions. Each question carries 2marks.

PART-C Five questions will be asked either or type. One question from every unit. Answer either A or B. Each question carries 15 marks. A and B have subdivisions (7+8).

The questions are to be numbered from 1 to 25. All the units are to be covered with equal weight age.

PART A Definitions and statements Question Number 1 to 5	5x1=5 Marks
PART B Short answer questions Question Number 6 to 20	10x2=20 Marks
PART C Descriptive answer type questions (Either A or B) Question Number 21 to 25	5x15=75 Marks
TOTAL	100 Marks

Note: Board Examinations will be Conducted for 100 Marks and converted to 75 Marks.

MODEL QUESTION PAPER
42933 SAFETY MANAGEMENT

Time: 3 Hrs. **Max Marks: 100**

PART- A

5 x 1 = 5

Answer all Questions. Each Question Carries One Marks.

1. What is line function for safety?
2. What is IRT?
3. State reportable accident.
4. State frequency rate.
5. Define: Safety pledge.

PART- B

10 x 2 = 20

Answer any TEN Questions. Each Questions Carries two Marks.

6. What does safety policy mean?
7. What is staff function for safety?
8. State the optimization function.
9. What is job safety analysis?
10. State any two techniques of safety management.
11. State any two types of safety inspection inspection.
12. State principles of accident prevention.
13. What is domino sequence?
14. What are the records for accident?
15. Mention the types of disabilities
16. Define: Safety activity rate.
17. Define total permanent disabilitity.
18. State importance of training.
19. What are training methods?
20. What is the role of government agencies in safety training?

PART- C

5 x 15 = 75

Answer all questions.

21. (a) (i) Explain the procedure of planning for safety for optimization of productivity. (7)

(ii) Explain line and staff functions for safety. (8)

(OR)

(b) (i) Explain the procedure of safety policy. (7)

(ii) Explain evolution of modern safety concept. (8)

22. (a) (i) Explain disaster control. (8)

(ii) Explain the procedure of job safety analysis. (7)

(OR)

(b) (i) Explain safety survey and safety inspection. (8)

(ii) write a short notes on

a) Safety sampling b) Safety audit (7)

23. (a) (i) Explain accident investigation and analysis. (8)

(ii) Explain the principles of accident prevention. (7)

(OR)

(b) (i) Explain the procedure of departmental accident report. (7)

(ii) Explain the role of safety committee.

(8)

24. (a) (i) Discuss recommended practices for compiling and measuring work injury experience. (8)

(ii) Compare permanent total disabilities and temporary total disabilities (7)

(OR)

(b) (i) What are the steps to be followed for the calculation of accident indices and severity rate. (8)

(ii) Write down the easy steps for the calculation of safety “t” score and safety activity rate. (7)

25. (a) (i) Explain the methods to be followed in training. (8)

(ii) Explain the role of private consulting agencies in safety training. (7)

(OR)

(b) (i) Explain the methods of promoting safe practice. (8)

(ii) What are the functions to be adopted in domestic safety and training. (7)

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42934

Semester III

Subject title : Basic First AID

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester: 16Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
Basic First AID	**5**	**80**	**25**	**100***	**100**	**3 Hrs**

***Examination will be conducted for 100 marks and it will be reduced to 75 marks**

Topics and Allocation of Hours

unit	Topics	Hrs
I	Becoming a First Aider	15
II	Respiratory Problems & Wounds and Circulation	15
III	Bone, joint and muscle injuries & Effects of heat and cold	15
IV	Foreign objects, poisoning, bites & stings	15
V	Medical conditions, Techniques and Equipment	13
	Test and Model Exam	07
	total	80

RATIONALE:

To know about the basics of first aid can prevent a bad situation from getting worse. Consider a patient who is bleeding from a deep cut. By applying pressure using simple first aid techniques, you can prevent a medical emergency from rapidly deteriorating and stabilize the patient until further medical help arrives.

OBJECTIVES:

- To explain about the basics of first aider acts.
- To describe the respiratory problems and wounds.
- To understand the body injuries effects.
- To learn about the foreign objects and poison effects in body.
- To understand about the medical conditions, techniques and equipments.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**Becoming a First Aider** First aider- Preparing yourself for first aid- Protection from infection, dealing with a casualty, requesting help, The use of medication, remember your own needs- action at an emergency, traffic accidents, fires, electrical incidents, water incidents, major incident / Mass casualties-Assessing the sick or injured, mechanisms of injury, primary survey, secondary survey, head-to-toe examination, monitoring vital signs-breathing and circulation, life-saving priorities, unconscious adult, unconscious child, unconscious infant, How to use an AED	15
II	**RESPIRATORY PROBLEMS & WOUNDS AND CIRCULATION** **Respiratory Problems** The respiratory system, hypoxia, airway obstruction, choking adult, choking infant, choking child, hanging and strangulation, Inhalation of fumes, drowning, hyperventilation, asthma, croup. Penetrating chest wound-the heart and blood vessels bleeding. **Wounds and circulation** Wound- types, shock, severe external bleeding, Impalement, amputation, crush injury, cuts and scrapes, bruising, blisters, infected wound, foreign object in a wound, scalp and head wounds, eye wound, bleeding from the ear, nosebleed,	10 5

	knocked-out adult tooth, bleeding from the mouth, finger wound, wound to the palm, wound at a joint crease, Abdominal wound, vaginal bleeding, bleeding varicose vein.	
III	**BONE, JOINT AND MUSCLE INJURIES & EFFECTS OF HEAT AND COLD** **Injuries** The skeleton, bones, muscles and joints, fractures, dislocated joint, strains and sprains, the nervous system, head injury, facial injury, lower jaw injury, cheekbone and nose injury, collarbone injury, shoulder injury, upper arm injury, elbow injury, forearm and wrist injuries, hand and finger injuries, rib injury, fractured pelvis, back pain, Spain injury, hip and thigh injuries, lower leg injuries, knee injury, ankle injury, foot and toe injuries, cramps the skin, **Effects of heat and cold** Assessing a burn, severe bums and scalds, minor bums and scalds, bums to the airway, electrical burn, chemical burn, chemical bum to the eye, lash bum to the eye, Incapacitant spray exposure, dehydration, Sun burn, heat exhaustion, heatstroke, hypothermia, frostbite.	10 5
IV	**FOREIGN OBJECTS, POISONING, BITES & STINGS** The sensory organs, splinter, embedded fishhook, swallowed foreign object, foreign object in the eye, foreign object in the ear, foreign object in the nose, how poisons affect the body, types of poisons, swallowed poisons, drug poisoning, alcohol poisoning, animal and human bites, insect sting, tick bite other bites and stings, snake bite, stings from sea creatures, Marine puncture wound.	15
V	**MEDICAL CONDITIONS, TECHNIQUES AND EQUIPMENT** Angina, heart attack, stroke, diabetes mellitus, hyperglycemia, hypoglycemia, seizures in adults, seizures in children, fever meningitis, fainting, allergy, anaphylactic shock, headache, migraine, sore throat, earache and toothache, abdominal pain,	13

	vomiting and diarrhea, childbirth, emergency childbirth, removing clothing, removing headgear, casualty handling, first aid materials, dressings, cold compresses, principles of bandaging, roller bandages, tubular gauze bandages, square knots, hand and foot cover, armsling, elevation sling and improvised slings.	

Reference Books:

1. The authorized manual of St. John Ambulance, St. Andrew's Ambulance association and the British red cross society, First Aid manual, 9th edition, Dorling Kindersley, London
2. American college of emergency physicians, First Aid manual, 5th edition, Dorling Kindersley, London
3. Clement Text book on First Aid & Emergency Nursing, First edition, JP brothers, 2012
4. Philip Jevon, Emergency care and First Aid for Nurses, A practical guide, Churchill Living Stone, 2007.

Board Examination Question Paper Pattern

Time: 3 Hrs

Max. Marks: 100

PART -A Five question will be asked covering all units. All questions are to be answered. Each question carries 1 mark.

PART-B Fifteen questions will be asked covering all the units. Three question from each unit. Answer any ten questions. Each question carries 2marks.

PART-C Five questions will be asked either or type. One question from every unit. Answer either A or B. Each question carries 15 marks. A and B have subdivisions (7+8).

The questions are to be numbered from 1 to 25. All the units are to be covered with equal weight age.

PART A Definitions and statements Question Number 1 to 5	5x1=5 Marks
PART B Short answer questions Question Number 6 to 20	10x2=20 Marks
PART C Descriptive answer type questions (Either A or B) Question Number 21 to 25	5x15=75 Marks
TOTAL	100 Marks

Note: Board Examinations will be Conducted for 100 Marks and converted to 75 Marks.

MODEL QUESTION PAPER

42944-BASIC FIRST AID

Time : 3Hours **MAX.MARKS:**100

PART –A

Answer all Question, Each Question Carries One Mark **5x1=5**

1. State any two electrical incident
2. What is hypoxia?
3. What are the signs and symptoms of hypothermia?
4. State ant two symptoms of insect sting?
5. What is anaphylactic shock?

PART-B

Answer any ten questions, Each Question Carries two Mark **10x2=20**

6. Why is medication important?
7. What is primary survey?
8. State the types of electrical incident
9. What are the common types of shock?
10. How to prevent drowning accident?
11. What to do if a infant is choking?
12. What is dehydration?
13. What causes sprains and strains?
14. What is burn injury? How many kinds of burn injuries are there?
15. How do you remove an embleeded fish hook?
16. What are the effects of stinging insects?
17. What should you do if someone is poisoned?
18. What are the symptoms of hypoglycemia?
19. State the principles of bandaging
20. What are the first aid materials?

PART-C

Answer all Questions **5x15=75**

21. A) i) Write down the procedure for protection from infection and dealing with causality (8)

ii) Explain the emergency action plan in first aid. (7)

(OR)

B) i) Explain any three primary injury. (7)

ii) How do you to a head to toe examination? (8)

22. A) i) Explain any four respiratory problem. (7)

ii) What happens when there is penetrating injury to chest? How do you threat? (8)

(OR)

B) i) Explain the types of wolend . (7)

ii) How do you treat abdominal wolend and vaginal bleeding? (8)

23. A) i) What are the steps to be followed in first aid for fractures and dislocated joints.(7)

ii) What are the steps to be needed in first aid for knee injury and ankle injury (8)

(OR)

B) i) What the steps to be needed for severe burns and minor burns (8)

ii) Explain first aid for electrical burn and chemical burn. (7)

(OR)

24. A) Explain the types of poisons and poisoning.

(OR)

B) Explain the types of bites and stings and also the steps to be needed in first aid.

25 A) Explain the procedure of removing clothing, removing head gear causality handling and dressing.

(OR)

B) Explain the types of bandages and slings.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42935

Semester : III

Subject Title : Safety Engineering Practical

TEACHING AND SCHEME OF EXAMINATIONS:

No. of Weeks per Semester: 16 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Safety Engineering Practical	4	64	25	100*	100	3Hrs

***Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

Objectives

- Identify the equipments used in safety engineering
- Preparation of flow charts for reporting of accidents
- Perform job safety analysis
- Identify the industrial accidents

List of Experiments:

1. Study of Personal Protective Equipments.
2. Design of safety training posters.
3. Identification of unsafe Acts, Unsafe condition.
4. Developing the Flowchart for reporting of accidents according to its severity.
5. Analysis of Data on Industrial Accidents.

6. Determination of accident rate and severity rate of an accident.
7. Determination of Cost and Man-hour Losses in an accident.
8. Performing evidence- based Accident Investigation for a mock accident.
9. Performing incident recall technique for an event.
10. Performing why-Why Analysis for a work/ Task.
11. Performing Job safety Analysis for a Work/ Task.

LIST OF EQUIPMENTS / DATA (for a batch of 30 Students)

- Engineering drawing equipment and Instruments
- Real world scenarios
- Reliable Accident data from Director of Industrial safety and health
- Mock Accident Data
- Mock Accident details and Scenarios
- Mock Accident details and an eye-witness
- Personal Protective Equipments
- IS 3786: 1983 document copy

BOARD EXAMINATION

DETAILED ALLOCATION OF MARKS

Internal Mark

Note: All the students should maintain the observation note book/ manual as per the regulation..

Observation - 10 Mark
Record work - 10 Mark
Attendance -05 Marks
Total -25Marks

Board Examination

Note: All the exercises have to be completed. All the exercises should be given in the question paper and students are allowed to select by a lot.
Record note book should be submitting during examination

ALLOCATION OF MARKS

Aim/Procedure/Material preparation/ Arrangements	-	30
Demonstration/ Flow chart/Data analysis	-	35
Result and discussion	-	25
Viva-Voce	-	10
Total marks	**-**	**100**

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42936

Semester III

Subject Title : First AID Practical

TEACHING AND SCHEME OF EXAMINATIONS:

No. of Weeks per Semester: 16 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
First AID Practical	4	64	25	100*	100	3Hrs

***Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

Objectives:

- Identify the first aid kit used in fire safety
- Perform evacuations techniques
- Preparation of first aid burns, electric shock, and injuries
- Perform and discuss Basic Cardio Pulmonary resuscitation

List of Experiments:

1. Demonstration of First Aid Kit (Small, Medium and Large First Aid box.)
2. First Aid for bleeding Wounds.
3. First Aid for Burns (Chemical, Electrical, Thermal Burns).
4. First Aid for Electrical shock.
5. First Aid for fits
6. First Aid for Injuries.
7. Performing evacuations exercises.
   (Single Helper Technique: Shoulder Pull, Cradle, Human Crutch, Fireman's lift))
8. Performing evacuations exercises.
   (Multiple Helper Technique: Human Crutch, hand Seat, and aft method, Kitchen-Chair Carry, three person carry).
9. Performing evacuations exercises.
   (Multiple Helper Technique: Stretcher. Blanker, Emergency Lifts)
10. Performing Basic Cardio Pulmonary resuscitation (CPR).

List of Equipments / DATA (for a batch of 30 Students)

- Small first Aid Box- 5Nos
- Medium first Aid Box – 5Nos
- large first Aid Box – 5Nos
- A Volunteer as the victim or Dummy Human Body Dressing- 1No
- A Volunteer as the victim or Dummy Human Body bandages, Slings-1No
- A Volunteer as the victim or Dummy Human Body, chair blanket-1No
- A Volunteer as the victim or Dummy Human Body, chair blanket- 1No
- CPR Dummy -1No
- First aid leaflet issued by Government of India
- Chemical eye wash shower-5 Nos
- Eye wash cup-5 Nos

BOARD EXAMINATION

DETAILED ALLOCATION OF MARKS

Internal Mark

Note: All the students should maintain the observation note book/ manual as per the regulation.

Observation - 10 Marks
Record work - 10 Marks
Attendance -05 Marks
Total -25 Marks

Board Examination

Note: All the exercises have to be completed. All the exercises should be given in the question paper and students are allowed to select by a lot.
Record note book should be submitting during examination.

ALLOCATION OF MARKS

Aim/Procedure/Material preparation/ Arrangements	-	30
Demonstration/ Flow chart/Data analysis	-	35
Result and discussion	-	25
Viva-Voce	-	10
Total marks	**-**	**100**

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42937

Semester III

Subject Title : Personal Protective Equipment Practical

TEACHING AND SCHEME OF EXAMINATIONS:

No. of Weeks per Semester: 16 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Personal Protective Equipment Practical	4	64	25	100*	100	3Hrs

***Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

Objectives

- Identify the tools used in respiratory, non respiratory PPE
- Preparation of inspection methods for the personal protective equipment- head protection- industrial safety helmet
- Preparation of industrial safety equipment
- Study and prepare safety protective equipments for professional use.
- Study of maintenance of respiratory protective devices.

List of Experiments:

1. Demonstration on the specification and inspection methods for the personal protective equipment- head protection- industrial safety helmet.
2. Demonstration on the specification and inspection methods for the protective equipment – Body protection. Aprons and protective leather clothing.
3. Demonstration on code or practice for care and maintenance of industrial safety clothing.
4. Demonstration on guide for selection of industrial safety equipment for eye, face and ear protection.
5. Demonstrations on code of practice for maintenance and care of industrial safety equipment for face and ear protection.
6. Demonstration on specification for safety footwear- safety protective equipments footwear for professional use.
7. Demonstration on specification for safety gloves- leather and cotton gloves.
8. Demonstration on guide for selection of industrial safety equipment for the protections of arms and hands.
9. Demonstration on recommendations for selection use and maintenance of respiratory protective devices.
10. Demonstration on specification for breathing apparatus.
11. Demonstration of fall Protection device (Safety harness).

List of Equipments / DATA (for a batch of 30 Students)

- Non respiratory PPE Safety helmet- 5Nos.
- Face shield – 5Nos.
- Safety Goggles – 5Nos.
- Welding shield – 5Nos.
- Ear Muff, Ear Plug -5 Nos.
- Apron, Gloves, Gum boots- 5Nos.
- Safety shoes, Safety harness- 5Nos.
- Respiratory PPE, Cotton Mask, Canister mask, Catridge mask, Surgical mask- 5Nos.
- SCBA - Self contained breathing apparatus- 2Nos.
- Safety harness- 4Nos.

BOARD EXAMINATION

DETAILED ALLOCATION OF MARKS

Internal Mark

Note: All the students should maintain the observation note book/ manual as per the regulation.

Observation - 10 Marks
Record work - 10 Marks
Attendance -05 Marks
Total -25 Marks

Board Examination

Note: All the exercises have to be completed. All the exercises should be given in the question paper and students are allowed to select by a lot.
Record note book should be submitting during examination

ALLOCATION OF MARKS

Aim/Procedure/Material preparation/ Arrangements	-	30
Demonstration/ Flow chart/Data analysis	-	35
Result and discussion	-	25
Viva-Voce	-	10
Total marks	**-**	**100**

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42941

Semester : IV

Subject title : ELECTRICAL SAFETY

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester: 16Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
ELECTRICAL SAFETY	**5**	**80**	**25**	**100***	**100**	**3 Hrs**

***Examination will be conducted for 100 marks and it will be reduced to 75 marks**

Topics and Allocation of Hours:

unit	Topics	Hrs
I	Basic concepts of electrical system	15
II	Protection systems	15
III	Selection, installation, operation and maintenance	15
IV	Electrical safety in hazardous zones	15
V	Indian electricity rules and safety regulations	13
	Test and Model Exam	07
	Total	80

RATIONALE:

To give an idea of the hazards caused by electricity, case studies about real-life deaths will be described. Whenever we work with power tools or on electrical circuits, there is a risk of electrical hazards, especially electrical shock. Anyone can be exposed to these hazards at home or at work.

OBJECTIVES:

- To explain about the basic concepts of electrical system.
- To describe the electrical protection systems.
- To explain about the environment in selection, installation, operation and maintenance.
- To understand the electrical safety in hazardous zones
- To know about the Indian electricity rules and regulations.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**BASIC CONCEPTS OF ELECTRICAL SYSTEM** Basic knowledge of electrical circuit element and parameters, measurement methods and measuring instruments used for electrical parameters, ohms law , current, voltage, power in DC circuits, active power , reactive power, energy, frequency , power factor in single and three phase AC circuits.	15
II	**PROTECTION SYSTEMS** Fuse, circuit breakers and overload relays – protection against over voltage and under voltage –safe limits of amperage – voltage –safe distance from lines-capacity and protection of conductor- joints-and connections, overload and short circuit protection-no load protection-earth fault protection. FRLS insulation-insulation and continuity test-system grounding-equipment grounding-earth leakage circuit breaker (ELCB)-cable wires maintenance of ground-ground fault circuit interrupter-use of low voltage-electrical guards-Personal protective equipment – safety in handling hand held electrical Appliances, tools and medical equipments.	15
III	**SELECTION, INSTALLATION, OPERATION AND MAINTENANCE** Role of environment in selection-safety aspects in application - protection and interlock-self diagnostic features and fail safe concepts-lock out and work permit system-discharge rod and earthing devices-safety in the use of portable tools-cabling and cable joints-preventive maintenance. Building Electrical Installations- Points to be inspected,	15

	Insulation Resistance Measurement Procedure, Points to be checked in switches and fuses, Points to be inspected in portable equipment, Action to be taken if electrical equipment catches fire, Different types of Fire extinguishers & their applications.	
IV	**ELECTRICAL SAFETY IN HAZARDOUS ZONES** Primary and secondary hazards-shocks, burns, scalds, falls-human safety in the use of electricity. Energy leakage-clearances and insulation-classes of insulation-voltage classifications of excess energy-current surges over current and short circuit current-heating effects of current electromagnetic forces-corona effect-static electricity –definition, sources, hazardous conditions, control, electrical causes of fire and explosion-ionization, spark and arc-ignition energy-Lightning, hazards, lightning arrestor, installation –Earthing, Specifications, earth Resistance, earth pits Maintenance.	15
V	**INDIAN ELECTRICITY RULES AND SAFETY REGULATIONS** Standards on electrical safety - safe limits of current, voltage – earthing of system neutral – Rules regarding first aid and fire fighting facility, relevant IS/NEC/IEC standards mentioned in CEA regulations are used in connection with generations, transmission, distribution of electricity, testing procedures, earthing of electrical apparatus and switch gears, fire safety, national electrical code, national building code, regulations code and standards as mentioned above.	13

Reference Books:

1. ”Accident prevention manual for industrial operations”, N.S.C., Chicago, 1982.
2. Indian Electricity Act and Rules, Government of India.
3. Power Engineers – Handbook of TNEB, Chennai, 1989.
4. Fordham Cooper, W., “Electrical Safety Engineering” Butterworth and Company, London, 1986

Board Examination Question Paper Pattern

Time: 3 Hrs

Max.Marks: 100

PART -A Five question will be asked covering all units. All questions are to be answered. Each question carries 1 mark.

PART-B Fifteen questions will be asked covering all the units. Three question from each unit. Answer any ten questions. Each question carries 2marks.

PART-C Five questions will be asked either or type. One question from every unit. Answer either A or B. Each question carries 15 marks. A and B have subdivisions (7+8).

The questions are to be numbered from 1 to 25. All the units are to be covered with equal weight age.

PART A Definitions and statements Question Number 1 to 5	5x1=5 Marks
PART B Short answer questions Question Number 6 to 20	10x2=20 Marks
PART C Descriptive answer type questions (Either A or B) Question Number 21 to 25	5x15=75 Marks
TOTAL	100 Marks

Note: Board Examinations will be Conducted for 100 Marks and converted to 75 Marks.

MODEL QUESTION PAPER

42941-ELECTRICAL SAFETY

TIME: 3-hrs **MAX.MARKS**: 100

PART –A

Answer all questions, Each question carries one mark **5x1=5**

1. State Ohm's law.
2. Expand ELCB.
3. Name the device used for measuring insulation resistance.
4. What is the use of lightning arrestor?
5. What is meant by earthing?

PART-B

Answer any ten questions, Each Question Carries two Mark **10x2=20**

6. Write down the measuring instruments used in electrical system.
7. Define current and write the unit.
8. Define frequency.
9. What is the necessity of fuse used in electrical circuit?
10. Write short notes on circuit breakers.
11. What is the use of overload relays?
12. List the various types of fire extinguisher.
13. Write short notes on discharge rod.
14. What is meant by interlock?
15. What is primary and secondary hazard?
16. How to maintain earth pit?
17. Explain corona effect.
18. Write down the safe limits of current and voltage.
19. How to earth electrical apparatus?
20. List the various national electrical codes.

PART-C

Answer all questions. **5x15=75**

21. A) Explain the following terms,

    1. Active power and Reactive Power. (8)
    2. Power in single and three phase AC circuits. (7)

(OR)

B) Describe the following,

1. Power in DC circuits. (8)
2. Measuring instruments used for Electrical Parameter.(7)

22. A). i). Explain briefly over voltage and under voltage protection in electrical system. (8)

ii). Explain overload and short circuit protection. (7)

(OR)

B) i).Explain with neat sketch ELCB. (8)

ii).Explain safety measures for handling hand held electrical appliances and tools. (7)

23. A) i).Explain self diagnostic features and fail safe concepts (8)

ii).Explain in detail about insulation resistance measurement. (7)

(Or)

B) i).What are the action to be taken if electrical equipment catches fire? (8)

ii). Explain different types of Fire extinguishers and their applications. (7)

24. A) i).Explain in detail electrical safety in hazardous zone. (8)

ii).How to prevent electric shock? (7)

(OR)

B) i). Explain electrical causes of fire and explosion. (8)

ii). Explain in detail about earth resistance measurement. (7)

25). A) i). Explain Rules regarding first aid and fire fighting facility. (8)

ii). Explain briefly earthing of system neutral. (7)

(OR)

B) Describe the following,

1. Standards on Electrical safety. (8)
2. National electrical code. (7)

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42942

Semester IV

Subject title : Fire Control Technology

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester: 16Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
Fire Control Technology	**5**	**80**	**25**	**100***	**100**	**3 Hrs**

***Examination will be conducted for 100 marks and it will be reduced to 75 marks**

Topics and Allocation of Hours

unit	Topics	Hrs
I	Hose	15
II	Rope, Lines, knots and ladders	15
III	SCBA and foam making equipments	15
IV	Pumps, primers, tenders and water relays	15
V	Fire alarm	13
	Test and Model Exam	07
	Total	80

RATIONALE:

This course will enable the students to understand various fire prevention methods, fire protection method and the modern equipments used for fire prevention and fire protection. That includes working principle, design and construction, operation, maintenance, transportation and safe custody etc. with appropriate practical in related equipments and systems.

OBJECTIVES:

- To explain about the hose types and details.
- To explain about the rope lines, knots and ladders.
- To describe about the BA sets and making equipments.
- To explain about the pump, primers and water relays.
- To know the fire alarm and maintenance.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**Hose** Types of hose- characteristics- frictional lose- material used, cause and prevention of mildew, causes and prevention of shock- causes and prevention of rubber acid- care and maintenance. types of hose fittings, couplings, component parts of inter locking couplings- suction coupling wrenches, branches, nozzles and branch holders- foam making branches, nozzles- collecting head and suction hose fittings- breechings, adapters- maintenance of Hose fittings.	15
II	**Rope, Lines, knots and ladders** **Ropes and lines** Introduction- manufacturing materials- types of ropes and size- cordage, causes of deterioration of ropes and lines- different type of lines. **knots and ladders** Different type of knots- purpose of knots- Ladder introduction- hook ladders, escape ladder, turn table and Extension ladder- hook ladder belts.	8 7

III	**SCBA and foam making equipments** **SCBA(Self Contained breathing apparatus)** Introduction- physiology of respiration- effects of respiration- essential fetchers of BA set- description and technical details-Care and maintenance of various BA sets- advantages and disadvantages of various BA set. **foam and foam making equipments** Foam and foam making equipments- different types of foam concentrate- storage- characteristics- foam branch and its type- Mechanical foam generator.	8 7
IV	**Pumps, primers, tenders and water relays** **Pumps and primers** Introduction- definition, pumps- different types, primers-types- working principle of various pump primers- maintenance and troubleshooting- testing of pumps- Advantages and disadvantages. **Tenders and water relays** Water relay system- open circuit system- closed circuit system. Tenders – types - fire alarm system- operation and maintenance of Various tenders- water, foam, Co_2- DCP and emergency tenders.	7 8
V	**Fire alarm** Introduction of electronics and electricity- semi conductor physics- circuit control and protective devices- transistors- principles of fire detectors- parts of fire alarm unit- control panel- type of detectors- automatic fire detection- classification of detector- control and indicating equipment- trouble shooting and maintenance- Intruder Alarms.	13

Reference Books:

1. Fire Technology -R.S. Gupta
2. Fire Equipment - David L. Bever
3. Industrial Safety Management – M.K. Tarafdar, K.J. Tarafdar
4. Industrial Safety, Health and Environment Management System – R.K. Jain, Sunil

S. Rao.

5. Carl Goodson, “Essentials of fire fighting” Fire protection publications; 5th edition
6. Pann Well, “Fire engineering’s skill drills for Fire Fighter”, Pann Well; 1st & 2 nd edition.
7. Fir Engineering Science & Technology- NIFE, kochi-wwwnifeindia.com. 2011.
8. Principles of fire safety engineering: Akilkumar Das, Educreation Publishing. 2012

Board Examination Question Paper Pattern

Time: 3 Hrs

Max.Marks: 100

PART -A Five question will be asked covering all units. All questions are to be answered. Each question carries 1 mark.

PART-B Fifteen questions will be asked covering all the units. Three question from each unit. Answer any ten questions. Each question carries 2marks.

PART-C Five questions will be asked either or type. One question from every unit. Answer either A or B. Each question carries 15 marks. A and B have subdivisions (7+8).

The questions are to be numbered from 1 to 25. All the units are to be covered with equal weight age.

PART A Definitions and statements Question Number 1 to 5	5x1=5 Marks
PART B Short answer questions Question Number 6 to 20	10x2=20 Marks
PART C Descriptive answer type questions (Either A or B) Question Number 21 to 25	5x15=75 Marks
TOTAL	100 Marks

Note: Board Examinations will be Conducted for 100 Marks and converted to 75 Marks.

MODEL QUESTION PAPER

42942- FIRE CONTROL TECHNOLOGY

Time : 3Hours **Max. Marks:** 100

PART-A

Answer all questions. Each question carries one mark. 5×1=5

1. Define Frictional loss.
2. What is the purpose of knots?
3. What is SCBA?
4. What is open circuit system?
5. What are the types of detector?

PART-B

Answer any TEN questions. Each questions carry equal marks 10×2=20

6. What is the use of Inter locking couples?
7. What are the types of houses?
8. Write short notes on foam making branches?
9. What are the types of ropes?
10. Briefly explain the causes of deterioration of ropes and lines.
11. Explain about hook ladder and escape ladder.
12. What are the effects of respiration?
13. Explain any two advantages and disadvantages of BA set?
14. Write short notes on foam making equipments.
15. What are the types of pumps?
16. Write short notes on testing of pumps
17. Write short notes on open circuit system of water relay?
18. What is semi conductor physics?
19. Write short notes on transistors.
20. What are different types of detectors?

PART-C

Answer all questions. **5×15=75**

21. **A)** i) Explain the causes and prevention of shocks. (7)
ii) Explain the causes and prevention of rubber acid (8)

(OR)

B) i) Explain the types of hose fittings (7)
ii) Explain about types of couplings (8)

22. **A**) i) Explain the types of ropes and its size. (7)
ii) Explain the causes of deterioration of ropes and lines (8)

(OR)

B) i) What are the different types of knots and purpose of knots (8)
ii) Explain the different types of ladders. (7)

23. **A)** i) Explain the physiology of respiration and effects of respiration. (8)
ii) Explain the advantages and disadvantages of BA sets (7)

(OR)

B) i) Explain about foam and foam making equipments. (7)
ii) Explain with sketch mechanical foam generator. (8)

24. **A)** i) Explain the different types of pumps. (7)
ii) Explain the working principle of pump primer. (8)

(OR)

B) i) Explain the open circuit system of water relay system. (8)
ii What is tenders? Explain the maintenance of various tenders (7)

25. **A)** i) Explain with neat sketch the principle of fire detector. (8)
ii) Explain the parts of fire alarm unit with neat sketch. (7)

(OR)

B) i) Explain the automatic fire detection system with neat sketch. (8)
ii) Explain in detail the trouble shooting and maintenance of fire detector. (7)

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42943

Semester IV

Subject title : Explosion Theory and Control

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester: 16Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
Explosion Theory and Control	**5**	**80**	**25**	**100***	**100**	**3 Hrs**

***Examination will be conducted for 100 marks and it will be reduced to 75 marks**

Topics and Allocation of Hours

unit	Topics	Hrs
I	Explosion	15
II	Explosion energy and energy calculations	15
III	Typical explosions and classification	15
IV	Fire dynamics	15
V	Explosion protecting systems	13
	Test and Model Exam	07
	Total	80

RATIONALE:

An explosive is a reactive substance that contains a great amount of potential energy which can produce an explosion if released suddenly, usually accompanied by the production of light, heat, sound, and pressure. An explosive charge is a measured quantity of explosive material, which may either be composed solely of one ingredient.

OBJECTIVES:

- To provide an in depth knowledge about the explosion.
- To understand the explosion energy.
- To know the various types of explosions.
- To understand the science of explosion and fire dynamics.
- To understand the various explosion protecting systems.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**EXPLOSION** Explosions- different types of explosions - causes - properties - principles of explosion-detonation and blast waves-explosion parameters -explosions in confined and unconfined geometries - dust explosion i) - dust explosion ii) - physical explosions - condensed phase explosions - condensed phase explosives based on hydrocarbons - condensed phase explosives and their properties - TNT equivalence and yield of an explosion- Quantification of damages in an explosion.	15
II	**EXPLOSION ENERGY AND ENERGY CALCULATIONS** Energy release in an explosion - energy release in a chemical reaction, standard heats of formation – stoichiometry - equivalence ratio and heat release in fuel - rich and oxidizer-rich compounds - energy release calculations, higher and lower calorific values, Internal energy of formation.	15

III	**TYPICAL EXPLOSIONS AND CLASSIFICATION** **3.1 Typical explosions** Intentional explosions- nuclear explosions- artillery and armaments- improvised explosive devices (IED), constructive uses of explosions, implosions, atmospheric dispersion-classification of explosions – **3.2 BLAST WAVE** blast wave modeling-prediction of blast wave strength from explosions using buckingham pi theorem, formulation and analysis, ideal and non-ideal explosions and blast waves - summary of predictions for blast wave using dimensional analysis, tailors prediction for nuclear explosions, non-dimensional decay Coefficient for a blast wave.	5 10
IV	**FIRE DYNAMICS** Flame spread - liquid surfaces, O2 enriched atmosphere - Phases of fire development - smoldering combustion , spontaneous ignition , flashover - compartment fires and unconfined fires – enclosures , phases of fire development and growth period- flashover and fully developed fire - human behavior in fire - movement speeds and Flow rates, causes of delay before evacuation.	15
V	**EXPLOSION PROTECTING SYSTEMS** Explosion protection systems-protection techniques- Containment, flame arrestors, isolation, suppression, venting. Explosion relief of large enclosure- explosion venting-inert gases, plant for generation of inert gas-rupture disc in process vessels and lines explosion, suppression system based on carbon dioxide (CO_2) and halons-hazards in LPG, ammonia (NH_3), sulphur dioxide (SO_3), chlorine (Cl_2) etc.	13

Reference Books:

1. ""Accident Prevention manual for industrial operations" N.S.C., Chicago, 1982.
2. "Davis Daniel et al, "Hand Book of fire technology"
3. "Fire Prevention and firefighting", Loss prevention Association, India.
4. Derek, James, "Fire Prevention Hand Book", Butter Worths and Company, London, 1986.
5. Dinko Tuhtar, "Fire and explosion protection"
6. Fire fighters hazardous materials reference book Fire Prevention in Factories", an Nostrand Rein Hold, New York, 1991.
7. Gupta, R.S., "Hand Book of Fire Technology" Orient Longman, Bombay 1977.

Board Examination Question Paper Pattern

Time: 3 Hrs

Max.Marks: 100

PART -A Five question will be asked covering all units. All questions are to be answered. Each question carries 1 mark.

PART-B Fifteen questions will be asked covering all the units. Three question from each unit. Answer any ten questions. Each question carries 2marks.

PART-C Five questions will be asked either or type. One question from every unit. Answer either A or B. Each question carries 15 marks. A and B have subdivisions (7+8).

The questions are to be numbered from 1 to 25. All the units are to be covered with equal weight age.

PART A Definitions and statements Question Number 1 to 5	5x1=5 Marks
PART B Short answer questions Question Number 6 to 20	10x2=20 Marks
PART C Descriptive answer type questions (Either A or B) Question Number 21 to 25	5x15=75 Marks
TOTAL	100 Marks

Note: Board

Examinations will be Conducted for 100 Marks and converted to 75 Marks.

MODEL QUESTION PAPER

42943-EXPLOSION THEORY CONTROL

Time : 3Hours **Max. Marks:** 100

PART-A

Answer all questions. Each question carries one mark. 5×1=5

1. Define explosion.
2. What is the stoichiometry?
3. What is a nuclear explosion?
4. What is smoldering combustion?
5. What is explosion protection system?

PART-B

Answer any TEN questions. Each questions carry equal marks 10×2=20

6. What are the types of explosion?
7. What are the causes for the explosion?
8. What is TNT equivalence?
9. Write short notes on energy release in explosion ?
10. What is rich compound?
11. What is internal energy of formation?
12. What is intentional explosion?
13. What is blast wave modeling?
14. Write short notes on ideal and non ideal explosions.
15. What is spontaneous ignition?
16. Write short notes on compartment fire.
17. Write short notes on flash over fire?
18. What are protection techniques?
19. Write short notes on venting.
20. What are different types of inert gas?

PART-C

Answer all questions. **5×15=75**

21. **A)** i) Explain the different types of explosions and its cause. (7)

ii) Explain the condensed phase explosives based on hydro carbons. (8)

(OR)

B) i) Explain in detail the principles of detonation (7)

ii) Write about the qualification of damages in an explosion (8)

22. **A**) i) Explain in detail about the energy release in explosion. (7)

ii) Explain about the equivalence ratio and heat release in fuel. (8)

(OR)

B) i) What are the energy release calculation. (8)

ii) Explain the higher and lower calorific values. (7)

23. **A)** i) Explain the nuclear explosion with neat sketch. (8)

ii) Explain the improvised explosive device (IED) with neat sketch (7)

(OR)

B) i) Explain about the prediction of blast wave strength from explosives by using buckingham pi theorem . (7)

ii) Write the difference between ideal and non- ideal explosions. (8)

.

24. **A)** i) Explain the phases of fire developments. (7)

ii) Explain about the different types of fires. (8)

(OR)

B) i) Explain about the human behavior in fire. (8)

ii) What are the causes of delay before evacuation (7)

25. **A)** i) Explain in detail about the explosion protection system. (8)

ii) What are the protection techniques? (7)

(OR)

B) i) Explain about any two suppression system. (8)

ii) Explain the working of inert gas generation plant. (7)

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42944

Semester IV

Subject title : Occupational Health and safety

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester: 16Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
Occupational Health and safety	**5**	**80**	**25**	**100***	**100**	**3 Hrs**

***Examination will be conducted for 100 marks and it will be reduced to 75 marks**

Topics and Allocation of Hours

unit	Topics	Hrs
I	Physical hazards	15
II	Chemical hazards	15
III	Biological and ergonomical hazards	15
IV	Occupational health and toxicology	15
V	Occupational physiology	13
	Test and Model Exam	07
	Total	80

RATIONALE:

OHS training can provide companies, their officers and managers, and the employees themselves with the training necessary to identify potential hazards and risks and provide helpful tips on how to eliminate or at least minimize those hazards in order to create a safer work environment for all employees.

OBJECTIVES:

- To have knowledge about types of hazards arising out of physical, chemical and biological agents
- To enable the students to learn about various functions and activities of occupational health services.
- To understand the basic knowledge on anatomy of human organs and its basic functions.
- To enable students to compare the hazards with the permissible levels.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**PHYSICAL HAZARDS** Noise- noise exposure regulation- properties of sound- occupational damage- risk factors- sound measuring instruments- octave band analyzer- noise networks, noise surveys noise, control program- industrial audiometric- hearing conservation programs. Vibration- types- effects- instruments- surveying procedure - permissible exposure limit. Ionizing radiation- types- effects- monitoring instruments- control programs- OSHA standard- non- ionizing radiations- effects, types- radar hazards- microwaves and radio-waves- lasers- TLV- cold environments, hypothermia, wind chill index, control measures- hot environments, thermal comfort, heat stress indices, acclimatization- estimation and control.	15
II	**CHEMICAL HAZARDS** Recognition of chemical hazards-dust, fumes, mist, vapour, fog, gases- types- concentration- exposure vs. dose, tlv - methods of evaluation, process or operation description, field survey, sampling methodology- industrial hygiene calculations- comparison with oshas standard. Air sampling instruments- types- measurement procedures, - instruments procedures- gas and vapour monitors- dust	15

	sample collection devices- personal sampling methods of control - engineering control, design maintenance considerations- design specifications - general control methods - training and education.	
III	**BIOLOGICAL AND ERGONOMICAL HAZARDS** Classification of Biohazardous agents – examples, bacterial agents, rickettsial and chlamydial agents, viral agents, fungal, parasitic agents, infectious diseases - Biohazard control program- employee health program-laboratory safety program-animal care and handling-biological safety cabinets - building design.Work Related Musculoskeletal Disorders – carpal tunnel syndrome CTS- Tendon pain- disorders of the neck- back injuries.	15
IV	**OCCUPATIONAL HEALTH AND TOXICOLOGY** Concept and spectrum of health - functional units and activities of occupational health services- pre- employment and post-employment medical examinations - occupational related diseases, levels of prevention of diseases- notifiable occupational diseases such as silicosis, asbestosis, pneumoconiosis, siderosis, anthracosis, aluminosis and anthrax- lead-nickel, chromium and manganese toxicity- gas poisoning (such as CO, ammonia, coal and dust etc) - effects and prevention – cardio pulmonary resuscitation- audiometric tests, eye tests, vital function tests.Industrial toxicology- local systemic and chronic effects,Temporary and cumulative effects- carcinogens entry into human systems.	15
V	**OCCUPATIONAL PHYSIOLOGY** Man as a system component – allocation of functions – efficiency – occupational work capacity – aerobic and anaerobic work – evaluation of physiological requirements of jobs – parameters of measurements – categorization of job heaviness – work organization – stress – strain – fatigue – Rest pauses – shift work – personal hygiene.	13

Reference Books:

1. Benjamin O.Alli, Fundamental Principles of Occupational Health and Safety ILO 2008.
2. Danuta Koradecka, Handbook of Occupational Health and Safety, CRC, 2010.
3. E.J. McCornick, and M. S Sanders, Human Factors in Engineering and Design, Tata McGraw-Hill, 1992.
4. Encyclopedia of “Occupational Health and Safety”, Vol.I and II, published by International Labour Office, Geneva, 1985
5. Hand book of “Occupational Safety and Health”, National Safety Council, Chicago, 1982.
6. Hand book of “Occupational Safety and Health”, National Safety Council, Chicago, 1982
7. Lawrence Slote , Handbook of occupational safety and health, Wiley, 2001.
8. Louis J. Di Berardinis, Handbook of occupational safety and health Wiley, 1999.

Board Examination Question Paper Pattern

Time: 3 Hrs

Max.Marks: 100

PART -A Five question will be asked covering all units. All questions are to be answered. Each question carries 1 mark.

PART-B Fifteen questions will be asked covering all the units. Three question from each unit. Answer any ten questions. Each question carries 2marks.

PART-C Five questions will be asked either or type. One question from every unit. Answer either A or B. Each question carries 15 marks. A and B have subdivisions (7+8).

The questions are to be numbered from 1 to 25. All the units are to be covered with equal weight age.

PART A Definitions and statements Question Number 1 to 5	5x1=5 Marks
PART B Short answer questions Question Number 6 to 20	10x2=20 Marks
PART C Descriptive answer type questions (Either A or B) Question Number 21 to 25	5x15=75 Marks
TOTAL	100 Marks

Note: Board Examinations will be Conducted for 100 Marks and converted to 75 Marks.

MODEL QUESTION PAPER

42944-OCCUPATIONAL HEALTH AND SAFETY

TIME: 3-hrs **MAX.MARKS:** 100

PART –A

Answer all Questions. Each Question Carries One Mark **5x1=5**

1. What is an OSHA standard?
2. Mention any one of air sampling instrument.
3. What is CTS?
4. What is chronic effect?
5. What is occupational physiology?

PART-B

Answer any ten questions. Each Question Carries two Mark **10x2=20**

6. Write the properties of sound.
7. What is octave band analyzer?
8. Write the difference between microwaves and radio waves.
9. What are fumes in chemical hazards?
10. What are the uses of gas and vapor monitors?
11. Mention the design specification of air sampling instrument.
12. Classify the bio hazardous agents.
13. What is a viral agent?
14. What is biological safety cabinet?
15. What is toxicology?
16. Mention the levels of prevention diseases.
17. What is audiometric test?
18. Define occupational work capacity.
19. What is stress and strain in occupational physiology?
20. What is personal hygiene?

PART-C

Answer all Questions. **5x15=75**

21. A) What is vibration, and mention the types of vibration, explain the effects of vibration.

(OR)

B) Define the ionizing radiation, write its types and explain the effects of ionizing radiation.

22. A) Briefly explain chemical hazards and its types.

(OR)

B) Describe the air sampling instruments, types and measurement procedures.

23. A) Explain briefly the following terms

i) Bio hazard control program. (8)

ii) Employee health program. (7)

(OR)

B) Briefly explain work related musculoskeletal.

24. A) i) Explain briefly concept and spectrum of health. (7)

ii) Explain occupational related diseases. (8)

(OR)

B) Explain briefly for the following terms

i) Local systemic and chronic effect. (8)

ii) Temporary and cumulative effect. (7)

25. A) Describe the functions of aerobic and anaerobic work.

(OR)

B) Explain the evaluation of physiological requirements of jobs.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42945

Semester IV

Subject Title : Electrical Safety Practical

TEACHING AND SCHEME OF EXAMINATIONS:

No. of Weeks per Semester: 16 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Electrical Safety Practical	4	64	25	100*	100	3Hrs

***Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

Objectives

- Identify and select controlling elements
- Study and prepare earthling
- Identify resistance for motors and cables
- Preparation of personal protective equipments
- Explore the performance of single phase circuit
- Preparation of relays, conductors, push buttons and limit switch

List of Equipments / DATA (for a batch of 30 Students)

PART-A- Electrical Engineering

1. Verification of OHM'S Law
2. Verification of series and Parallel Circuit.
3. Energy Measurement in Single Phase Circuit Using lamp Load.
4. Power Measurement in single Phase Circuit.
5. Testing of relays, conductors, Push buttons and limit switch.
6. Test the working of single phase preventer.
7. To Prepare a wiring circuit to check the availability of R/Y/B Phases using one lamp only by operating Individual switches for each phase and test it.

PART-B - Electrical Safety

1. Study of Personal Protective Equipments (PPE)
   (Respiratory and non –respiratory- demonstration- self- contained breathing apparatus. Safety helmet, safety Harness, hand gloves, goggles, safety shoe, gum boots, ankle shoes, face shield, nose mask, ear plug , ear muff, anti-static and conducting plastics/ rubber materials, apron and leg guard)
2. Measuring the Insulation Resistance for motors and cables.
3. Estimation of earth Resistance.
4. Earth continuity test.
5. Sensitivity test for ELCB, MCB, RCCB, MCCB.
6. Measurement of Lux level using lux Meter.
7. Loto System.

LIST OF EQUIPMENTS REQUIED (for a batch of 30 Students)

S.NO	NAME OF THE EQUIPMENTS	RANGE	REQUIRED
1.	DC Regulated power supply	(0-30V), 1A	1
2.	DC Voltmeter (Analog/ Digital)	Different Range	6
3.	DC Ammeter (Analog/ Digital)	Different Range	6
4.	Wattmeter	300V/10A	3
5.	Energy Meter	Single Phase	1
6.	Lamb load	-	1
7.	Resistive load	Single phase	1
8.	Relay	1-2/ 5A	1
9.	Contactor	Air Break, 20A,220V	1
10.	Push Button ON and OFF	2A, 220V	Each 5
11.	Limit Switch	20A, 220V	1
12.	Single Phase Preventer kit	-	1
13.	3 Phase Motor	-	1
14.	Personal protective equipments: safety helmet, Google, safety, Gloves , Nose mask, ear plug, safety belt	-	Each2
15.	Ohm meter, Megger & Insulation tester	-	Each 2
16.	Earth Megger kit with Necessary connecting Leads and Rods	-	1
17.	Earth Continuity Tester kit	-	1
18.	ELCB, MCB, RCCB, MCCB	2 pole, 20A & 4 pole, 20A	Each- 1
19.	LUX Meter	-	1
20.	Lockout / Tag out Kit and Device	-	1
21.	Multi meter	Digital	2

BOARD EXAMINATION

DETAILED ALLOCATION OF MARKS

Internal Mark

Note: All the students should maintain the observation note book/ manual as per the regulation.

Observation - 10 Marks
Record work - 10 Marks
Attendance -05 Marks
Total -25 Marks

Board Examination

Note: All the exercises have to be completed. All the exercises should be given in the question paper and students are allowed to select by a lot.
Record note book should be submitting during examination

ALLOCATION OF MARKS

Aim/Procedure/Material preparation/ Arrangements	-	30
Demonstration/ Flow chart/Data analysis	-	35
Result and discussion	-	25
Viva-Voce	-	10
Total marks	**-**	**100**

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42946

Semester IV

Subject Title : Fire Safety and Fighting Practical

TEACHING AND SCHEME OF EXAMINATIONS:

No. of Weeks per Semester: 16 Weeks

Subject	Instruction		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Fire Safety and Fighting Practical	4	64	25	100*	100	3Hrs

***Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

Objectives:

- Successfully extinguish fires with the use of a fire extinguisher.
- Successfully evacuate an installation on fire.
- Apply the theory of the fire triangle in preventing fires at worksites.
- Understand and use the principles of personal Protective Equipments.
- Understand the behavior of fire during its propagation.
- Installation of Fire detection and warning systems
- Communication with employees and others on the premises

List of Experiments

1. Determination of flash point and fire point of a substance.
2. Determination of calorific value of substance.
3. Determination of Fire Load in a Building / facility.
4. Determination of fire Triangle and Principle of fire extinction.
5. Basic fire Fighting using portable Dry Chemical Power fire extinguishers.
6. Basic Fire fighting using portable CO_2 fire extinguishers.
7. Refilling different type's extinguisher.
8. Reading and Demonstration Fire excavation plan.
9. Demonstration on the working of smoke, Beam and Flame detectors.
10. Demonstration of fire hydrant system and dry riser system in a building.
11. Demonstration of personal Protective Equipments used for fire fighting.
12. Study of different fire fighting vehicle.
13. Demonstration of different types of Knots, bend and hitches used in Fire fighting
14. Study and demonstration of hoses, couplings and braches

List of Equipments / DATA (for a batch of 30 Students)

- Cleveland Open cup Apparatus: Pensky-Martens Closed Cup Apparatus-2nos
- Bomb Calorimeter- 2Nos
- Standard data Book containing Calorific value of Various Substance-2Nos
- Fuel and Ignition Source
- Pool of fire and dry chemical Power fire Extinguisher- 3Nos
- Pool of Fire and CO_2 fire extinguisher- 3Nos
- Fire excavation Plan of any facility
- Smoke, Heat, Beam and Flame detectors – each 2 Nos
- Dummy fire Hydrant and Fire riser System- 2Nos
- Firefighter Gloves: Firefighter Structural Firefighting Boots: Firefighter, Garments, Firefighter Eye and ear Protection, fire fighter Head Protection.

BOARD EXAMINATION

DETAILED ALLOCATION OF MARKS

Internal Mark

Note: All the students should maintain the observation note book/ manual as per the regulation..

Observation - 10 Marks
Record work - 10 Marks
Attendance -05 Marks
Total -25 Marks

Board Examination

Note: All the exercises have to be completed. All the exercises should be given in the question paper and students are allowed to select by a lot.
Record note book should be submitting during examination

ALLOCATION OF MARKS

Aim/Procedure/Material preparation/ Arrangements	-	30
Demonstration/ Flow chart/Data analysis	-	35
Result and discussion	-	25
Viva-Voce	-	10
Total marks	**-**	**100**

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42947

Semester IV

Subject Title : Industrial Hygiene Practical

TEACHING AND SCHEME OF EXAMINATIONS:

No. of Weeks per Semester: 16 Weeks

Subject	Instruction		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Industrial Hygiene Laboratory	4	64	25	100*	100	3Hrs

***Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

Objectives:

- Preparation of Workers role in occupational health safety and hygiene service Programs
- Discuss the scope of occupational health and safety.
- Identify the elements of a work environment.
- Discuss the common interactions in the work place.
- Discuss the environmental impact, and understand the need to integrate occupational hygiene practice with environmental protection
- Understand the total lung capacity of human body

List of Experiments

1. Measuring lighter in a working environment and inferring with the standard values.
2. Measuring Noise level in a working environment and inferring with the standard values.
3. Measuring Vibration in a working environment and inferring with the standard values.
4. Measuring human Body vibration in a working environment and inferring with the standard values.
5. Measuring Heat in a working environment and inferring with the standard values.
6. Measuring humidity level in a working environment and inferring with the standard values.
7. Measuring total Lung capacity (TLC) of a human through Spiro meter.
8. Measuring total lung capacity (TLC) of a human through pulmonary function Test.
9. Study experiment on Radiation Safety.
10. Demonstration of personal protective equipment for Noise, Heat and respiration.

List of Equipments / DATA (for a batch of 30 Students)

- Light Meter- 2 Nos
- Sound-level meter- 2 Nos
- Vibro meter or Accelerometer- 2 Nos
- Human vibration Meter- 2 Nos
- Calorimeter- 2 Nos
- Hygrometer- 3 Nos
- Spiro meter- 3Nos
- Pulmonary function Test device- 2Nos
- Posters, Visual aids to learn Radiation Safety
- Ear Muffs, ear Plugs, Thermal protective Clothing Respirators- each 3Nos

BOARD EXAMINATION

DETAILED ALLOCATION OF MARKS

Internal Mark

Note: All the students should maintain the observation note book/ manual as per the regulation.

Observation - 10 Marks
Record work - 10 Marks
Attendance -05 Marks
Total -25 Marks

Board Examination

Note: All the exercises have to be completed. All the exercises should be given in the question paper and students are allowed to select by a lot.
Record note book should be submitting during examination

ALLOCATION OF MARKS

Aim/Procedure/Material preparation/ Arrangements	-	30
Demonstration/ Flow chart/Data analysis	-	35
Result and discussion	-	25
Viva-Voce	-	10
Total marks	**-**	**100**

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42951

Semester V

Subject title : Hazard Identification and Risk Management

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester: 16Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
Hazard Identification and Risk Management	**5**	**80**	**25**	**100***	**100**	**3 Hrs**

***Examination will be conducted for 100 marks and it will be reduced to 75 marks**

Topics and Allocation of Hours

unit	Topics	Hrs
I	Basics of Hazard, Risk and Risk Ranking	15
II	Evaluation of Hazard and Risk Analysis	15
III	Qualitative and Quantitative Hazard Analysis	15
IV	Safety Management Tools	15
V	Safety Instrumentation Systems	13
	Test and Model Exam	07
	Total	80

RATIONALE:

Risk assessments are very important as they form an integral part of an occupational health and safety management plan. They help to create awareness of hazards and risk.

OBJECTIVES:

- To explain about the basics of hazard, risk ranking.
- To analyze about the hazard and risk evaluations.
- To analyze quantitative hazards.
- To describe the safety instrumentation systems.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**Basics of Hazard, Risk and Risk Ranking** Introduction – hazard and risk – risk register, risk matrix and risk Ranking – consequence, PHA & ALARP – fault tolerance and plant ageing – safety instrumentation – functional safety.	15
II	**Evaluation of Hazard and Risk Analysis** Plant hazard analysis preliminaries – evaluation of plant hazard-selection techniques – comparison of various PHA methods – hazard identification (HAZID) and risk estimation – risk assessment and management.	15
III	**Qualitative and Quantitative Hazard Analysis** Preliminary hazard analysis(HAZAN) – data collection – what If analysis – checklist analysis – faults tree analysis (FTA) –Even tree analysis (ETA) -layer of protection analysis – human reliability analysis.	15
IV	**Safety Management Tools** Risk analysis and safety instrument loop(SIL) – SIL determination techniques – SIL calculation– SIL certifications and standards – Failure mode effect analysis (FMEA) / FMECA Methodology –	15

	FMEA/FMECA detection and risk priority number – controls 181 and recommended actions – automated FMEA concepts – hazard and operability studies (HAZOP) methodology – reporting and follow up – computer aided hazard analysis .	
V	**Safety Instrumentation Systems** Design and engineering – erection, commission and validation: safety life cycle – operation and maintenance – third party certification of instruments – electrical area classification – combustible/ flammable gas detection – explosion protection.	13

Reference Books:

1. Plant Hazard Analysis and Safety Instrumentation Systems", Swapan Basu, Academic Press – Elsevier, ISBN: 9780128037638.
2. "Risk Management Plan (RMP) & Process Safety Management (PSM) Manual", Newington Energy, General Electric Contractual Services, Triton Environmental Inc
3. Brown D.B. System analysis and design for safety, prentice Hall Inc. New Jersy 1976.
4. Dale H. Besterfield. et all., Total Quality management , person education. 2002.
5. Ebeling, An Introduction to reliability and maintainability Engineering. Tata McGraw, Hill 2004.
6. John V.Grimaldi and Rollin H.Simonds, Safety management, All India Travelers book seller. 1989.

Board Examination Question Paper Pattern

Time: 3 Hrs

Max.Marks: 100

PART -A Five question will be asked covering all units. All questions are to be answered. Each question carries 1 mark.

PART-B Fifteen questions will be asked covering all the units. Three question from each unit. Answer any ten questions. Each question carries 2marks.

PART-C Five questions will be asked either or type. One question from every unit. Answer either A or B. Each question carries 15 marks. A and B have subdivisions (7+8).

The questions are to be numbered from 1 to 25. All the units are to be covered with equal weight age.

PART A Definitions and statements Question Number 1 to 5	5x1=5 Marks
PART B Short answer questions Question Number 6 to 20	10x2=20 Marks
PART C Descriptive answer type questions (Either A or B) Question Number 21 to 25	5x15=75 Marks
TOTAL	100 Marks

Note: Board Examinations will be Conducted for 100 Marks and converted to 75 Marks.

MODEL QUESTION PAPER

42951-HAZARD IDENTIFICATION AND RISK MANAGEMENT

TIME: 3-hrs **MAX.MARKS:** 100

PART- A

Answer all Questions. Each Question Carries One Mark 5x1=5

1. What is the main purpose of hazard identification?
2. What is Risk analysis?
3. Which risk analysis approach takes more time to carry out?
4. What is SIL?
5. What is meant by flammable gas detection?

PART- B

Answer any ten questions. Each Question Carries two Mark 10x2=20

6. What is PHA & ALARP?
7. Define the term fault tolerance.
8. What is functional safety?
9. Define HAZID.
10. What are Plant hazard analysis preliminaries?
11. Define the term risk assessment.
12. What is FTA?
13. What is LOPA in safety?
14. Mention the checklist of hazard analysis.
15. What is FMEA?
16. Define the term HAZOP
17. Mention the standards of SIL.
18. What is meant by safety life cycle?
19. What is third party certification of instruments?
20. What is meant by explosion protection?

PART- C

Answer all Questions. **5x15=75**

21. A) Explain in brief for the following terms

    1. Hazard & Risk (8)
    2. Risk Ranking (7)

(OR)

B) Describe the following

    1. fault tolerance (8)
    2. safety instrumentation (7)

22. A) Explain the evaluation of plant Hazard.

(OR)

B) Illustrate the various PHA methods.

23. A) Explain briefly for qualitative and quantitative hazard analysis.

(OR)

B) Explain briefly in Faults tree analysis and even tree analysis.

24. A) Briefly explain for failure mode effect analysis.

(OR)

B) Illustrate the hazard and operability studies (HAZOP) methodology.

25. A) Explain the term erection, commission and validation for design and engineering.

(OR)

B) Explain briefly in explosion protection.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42952

Semester V

Subject title : Environmental Safety

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester: 16Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
Environmental Safety	**5**	**80**	**25**	**100***	**100**	**3 Hrs**

***Examination will be conducted for 100 marks and it will be reduced to 75 marks**

Topics and Allocation of Hours

unit	Topics	Hrs
I	Air pollution	15
II	Water pollution	15
III	Hazardous waste management	15
IV	Environmental measurement and control	15
V	Pollution control in process industries	13
	Test and Model Exam	07
	Total	80

RATIONALE:

Environmental safety is practices, policies and procedures that ensure the safety and well-being of anyone in the immediate area. This can include safety in terms of proper waste disposal, containment and storage of potentially toxic chemicals and much more.

OBJECTIVES:

- To explain about the air pollution sources, then how to react it.
- To describe the water pollution and water treatment.
- To explain about the Hazardous waste management.
- To understand to handle the environmental measuring instruments.
- To know about the pollution control processes in industries.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**AIR POLLUTION** Classification and properties of air pollutants – pollution sources – effects of air pollutants on human beings, animals, plants and materials - automobile pollution-hazards of air pollution-concept of clean coal combustion technology - ultra violet radiation, infrared radiation, radiation hazards from sun due to depletion of ozone – deforestation -automobile exhausts- chemical factory stack emissions-CFC.	15
II	**WATER POLLUTION** Classification of water pollutants-health hazards-sampling and analysis of water-water treatment - different industrial effluents and their treatment and disposal -advanced wastewater treatment - effluent quality standards and laws- chemical industries, tannery, textile effluents-common treatment.	15
III	**HAZARDOUS WASTE MANAGEMENT** Hazardous waste management in India-waste identification, characterization and classification- technological options for	15

	collection, treatment and disposal of hazardous waste-selection charts for the treatment of different hazardous wastes-methods of collection and disposal of solid wastes-health hazards-toxic and radioactive wastes-incineration and verification - hazards due to bio-process- dilution-standards and restrictions – recycling and reuse.	
IV	**ENVIRONMENTAL MEASUREMENT AND CONTROL** Sampling and analysis – dust monitor – gas analyzer- particle size analyzer – lux meter-pH meter – gas chromatograph – atomic absorption spectrometer. Gravitational settling chambers-cyclone separators-scrubbers-electrostatic precipitator - bag filter – maintenance - control of gaseous emission by adsorption, absorption and combustion methods- pollution control board-laws.	15
V	**POLLUTION CONTROL IN PROCESS INDUSTRIES** Pollution control in process industries like cement, paper, petroleum-petroleum products-textile- tanneries-thermal power plants – dying and pigment industries - eco-friendly energy.	13

Reference Books:

1. E. C Wolfe, Race to Save to Save Planet, Wadsworth Publishing Co., Belmont, CA 2006
2. G. T Miller, Environmental Science: Working with the Earth, 11th Edition, Wadsworth Publishing Co., Belmont, CA, 2006
3. M.J Hammer,., and M.J Hammer,., Jr., Water and Wastewater Technology, Pearson Prentice Hall, 2006
4. Rao, CS, “Environmental pollution engineering:, Wiley Eastern Limited, New Delhi, 1992
5. Varma and Braner, “Air pollution equipment”, Springer Publishers, Second Edition.

Board Examination Question Paper Pattern

Time: 3 Hrs

Max.Marks: 100

PART -A Five question will be asked covering all units. All questions are to be answered. Each question carries 1 mark.

PART-B Fifteen questions will be asked covering all the units. Three question from each unit. Answer any ten questions. Each question carries 2marks.

PART-C Five questions will be asked either or type. One question from every unit. Answer either A or B. Each question carries 15 marks. A and B have subdivisions (7+8).

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PART A Definitions and statements Question Number 1 to 5	5x1=5 Marks
PART B Short answer questions Question Number 6 to 20	10x2=20 Marks
PART C Descriptive answer type questions (Either A or B) Question Number 21 to 25	5x15=75 Marks
TOTAL	100 Marks

Note: Board Examinations will be Conducted for 100 Marks and converted to 75 Marks.

MODEL QUESTION PAPER

42952 -ENVIRONMENTAL SAFETY

TIME: 3 HOURS **MAX.MARKS: 100**

PART- A

Answer all Questions. Each Question Carries One Mark. 5x1=5

1. Which gas is mainly produced due to incomplete burning of wood?
2. Mention any one major cause of water pollution?
3. Who is the responsible for safe disposal of the generated hazardous waste?
4. What is the use of PH meter?
5. Mention the name of largest contributors to global pollution?

PART- B

Answer any ten questions. Each Question Carries two Mark 10x2=20

6. Mention the sources of pollution?
7. Write the concept of clean coal combustion technology.
8. What is the impact of air pollution on human health?
9. How do we detect water pollution?
10. Mention the effluent quality standards.
11. What can be used to test for water pollution?
12. What is meant by Hazardous waste management?
13. Mention the methods of disposal of solid waste.
14. What is meant by bio process in hazards?
15. Define the term gas analyzer.
16. What is lux meter?
17. What is electrostatic precipitator?
18. What is eco friendly energy?
19. Mention the name of the circuit used in thermal power plant.
20. Mention the process involved in pollution control.

PART- C

Answer all Questions. **5x15=75**

21. A) Explain in brief concept of clean coal combustion technology.

(OR)

B) i) Mention the classification and properties of air pollution. (8)

ii) Explain in brief chemical factory stack emissions. (7)

22. A) i) Mention the classification of water pollution. (8)

ii) Briefly explain sampling and analysis of water. (7)

(OR)

B) i) Illustrate the advanced waste water treatment. (7)

ii) Explain the different industrial effluents and their treatment and disposal. (8)

23. A) Explain briefly technological options for collection, treatment and disposal of hazardous waste.

(OR)

B) Explain briefly in toxic and radioactive wastes.

24. A) Briefly explain atomic absorption spectrometer.

(OR)

B) i) Explain gravitational settling chambers. (8)

ii) Mention the laws of pollution control board. (7)

25. A) Explain the pollution control in process industries.

(OR)

B) Draw and Explain the layout of thermal power plant.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42971

Semester V

Subject title : Safety In Engineering Industries **(Elective Theory)**

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester: 16Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
Safety In Engineering Industries	**5**	**80**	**25**	**100***	**100**	**3 Hrs**

***Examination will be conducted for 100 marks and it will be reduced to 75 marks**

Topics and Allocation of Hours

unit	Topics	Hrs
I	Work study and ergonomics	15
II	Principles of machine guarding	15
III	Safety in welding and gas cutting	15
IV	Safety in cold farming and hot working of metals	15
V	Safety in finishing, inspection and testing	13
	Test and Model Exam	07
	Total	80

RATIONALE:

To learn how to ensure safety in industrial settings, about manufacturing processes, laws and regulations, introduction to toxins, fire prevention and protection, and even foray into specialized areas such as ergonomics, the science of designing furniture, machines and spaces to promote productivity.

OBJECTIVES:

- To explain about the work study and ergonomics.
- To learn about principles of machine guarding.
- To explain about the safety welding process.
- To describe about the forming process.
- To know about the safety inspection and testing.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**WORK STUDY AND ERGONOMICS** Study of operations – work content – work procedure – breakdown – human factors – safety and method study – methods and movements at the workplace – substitution with latest devices – robotics concepts – applications in hazardous workplaces – productivity, quality and safety (PQS). definition - applications of ergonomic principles in the shop floor – work benches – seating arrangements.	15
II	**PRINCIPLES OF MACHINE GUARDING** Guarding during maintenance, Zero Mechanical State (ZMS), Definition and Policy for ZMS – guarding of hazards - point of operation protective devices, machine guarding, types, fixed guard, interlock guard, automatic guard, trip guard, electron eye, positional control guard, fixed guard fencing- guard construction- guard opening. selection and suitability: lathe-drilling-boring-milling-grinding- shaping-sawing-shearing-presses-forge hammer-flywheels-shafts- couplings-gears-sprockets, wheels and chains-pulleys and belts- authorized entry to hazardous installations-benefits of good guarding systems.	15

III	**SAFETY IN WELDING AND GAS CUTTING** Gas welding and oxygen cutting- resistances welding- arc welding and cutting- common hazards- personal protective equipment- training- safety precautions in brazing, soldering and metalizing – explosive welding, selection, care and maintenance of the associated equipment and instruments –safety in generation, distribution and handling of industrial gases-colour coding – flashback arrestor –leak Detection-pipe line safety-storage and handling of gas cylinders.	15
IV	**SAFETY IN COLD FARMING AND HOT WORKING OF METALS** Cold working- power presses- point of operation- safe guarding- auxiliary mechanisms- feeding and cutting mechanism- hand or foot-operated presses- power press electric controls- power press set up and die removal- inspection and maintenance-metal sheers-press brakes. Hot working safety in forging- hot rolling mill operation- safe guards in hot rolling mills – hot bending of pipes, hazards and control measures. Safety in gas furnace operation- cupola, crucibles, ovens- foundry health hazards- work environment- material handling in foundries-foundry production cleaning and finishing foundry processes.	15
V	**SAFETY IN FINISHING, INSPECTION AND TESTING** Heat treatment operations- electro plating- paint shops- sand and shot blasting- safety in inspection and testing- dynamic balancing- hydro testing- valves- boiler drums and headers- pressure vessels- air leak test- steam testing. Safety in radiography- personal monitoring devices- radiation hazards- engineering and administrative controls- Indian boilers regulation. Health and welfare measures in engineering industry-pollution control in engineering industry-industrial waste disposal.	13

Reference Books:

1. “Accident Prevention Manual for Industrial Operations”, NSC Chicago, 1982
2. “Safety in Industry” N.V. Krishnan Jaico Publisher House, 1996.
3. Hunter, Gomas, “Engineering Design for Safety”, Mc Graw Hill Inc., 1992.
4. “Occupational safety Manual” BHEL, Trichy, 1988.
5. Safety in the use of wood working machines, HMSO, UK 1992.
6. Health and Safety in welding and Allied processes, welding Institute, UK, High Tech. Publishing Ltd., London, 1989.

Board Examination Question Paper Pattern

Time: 3 Hrs

Max.Marks: 100

PART -A Five question will be asked covering all units. All questions are to be answered. Each question carries 1 mark.

PART-B Fifteen questions will be asked covering all the units. Three question from each unit. Answer any ten questions. Each question carries 2marks.

PART-C Five questions will be asked either or type. One question from every unit. Answer either A or B. Each question carries 15 marks. A and B have subdivisions (7+8).

The questions are to be numbered from 1 to 25. All the units are to be covered with equal weight age.

PART A Definitions and statements Question Number 1 to 5	5x1=5 Marks
PART B Short answer questions Question Number 6 to 20	10x2=20 Marks
PART C Descriptive answer type questions (Either A or B) Question Number 21 to 25	5x15=75 Marks
TOTAL	100 Marks

Note: Board Examinations will be Conducted for 100 Marks and converted to 75 Marks.

MODEL QUESTION PAPER

42971-SAFETY IN ENGINEERING INDUSTRIES

Time : 3hrs **Max. Marks**: 100

PART- A

Answer all questions. Each question carries one marks 5×1=5

1. What is meant by ergonomics?
2. Define ZMS.
3. What are the safety precautions in brazing?
4. What are the difference between hot working and cold working?
5. State the heat treatment operations.

PART- B

Answer any TEN questions. Each question carries equal marks 10×2=20

6. What are the objectives of method study?
7. What are the applications in hazardous workplaces
8. Write short notes on robotic concepts.
9. What are the types of machine guarding
10. Write short notes on ZMS.
11. What are the benefits of machine guarding systems?
12. Write short notes on resistance welding.
13. What is meant by flashback arrester?
14. Define leak detection.
15. What is meant by press brakes?.
16. Write short notes on hand operated presses.
17. What is the safety in hot working metals?
18. State the heat treatment operations.
19. What is the safety in radiography?
20. Write short notes on hydro testing.

PART- C

Answer all questions. **5×15=75**

21. A). Explain the basic work procedure of safety and method study.

(OR)

B) Briefly explain PQS.

22. A) Explain the types of machine guarding.

(OR)

B) Explain the various operations of lathe machine.

23. A) Explain the safety precautions in brazing, soldering and metalizing

(OR)

B) Explain with neat sketch in the personal protective equipment in welding

.

24. A) Briefly explain in auxiliary mechanisms.

(OR)

B) Explain the Safety in gas furnace operation.

25. A). Briefly explain Heat treatment operations.

(OR)

B) Explain the health and welfare measures in engineering industry.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42972

Semester V

Subject title : Safety in Process Industries and Powder Handling **(Elective Theory)**

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester: 16Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
Safety in Process Industries and Powder Handling	**5**	**80**	**25**	**100***	**100**	**3 Hrs**

***Examination will be conducted for 100 marks and it will be reduced to 75 marks**

Topics and Allocation of Hours

unit	Topics	Hrs
I	Concepts	15
II	Accident investigation and reporting	15
III	Safety performance monitoring	15
IV	Powder handling	15
V	Dust explosion	13
	Test and Model Exam	07
	Total	80

RATIONALE:

This subject helps students to understand to anatomy of an accident through a case study, historical perspective, statistics and current scenario, concepts of runaway,

methods to estimate risk of a reaction, various measuring techniques and case studies. Heat & Static electricity can lead to dust explosions, how to prevent such events. It also explains the dust explosions caused by heat of static electricity and their preventive measures.

OBJECTIVES:

- To explain about the basic techniques.
- To describe about accident investigation and reporting.
- To explain the safety performance monitoring.
- To describe the powder handling and dust explosion.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**CONCEPTS** Evolution of modern safety concept- safety policy - safety organization - line and staff functions for safety- safety committee- budgeting for safety. techniques- incident recall technique (IRT), disaster control, job safety analysis (JSA), safety survey, safety inspection, safety sampling, safety audit.	15
II	**ACCIDENT INVESTIGATION AND REPORTING** Concept of an accident- reportable and non reportable accidents- unsafe act and condition – principles of accident prevention- supervisory role- role of safety committee - accident causation models - cost of accident- overall accident investigation process - response to accidents. India reporting requirement-, planning document- planning matrix- Investigators kit- functions of investigator- four types of evidences- records of accidents- accident reports- class exercise with case study.	15

III	**SAFETY PERFORMANCE MONITORING** Permanent total disabilities- permanent partial disabilities- temporary total disabilities - calculation of accident indices- frequency rate, severity rate. Frequency severity incidence rate- incident rate- accident rate- safety "t" score- safety activity rate – problems.Importance of training-identification of training needs- training methods – programme, seminars, conferences, competitions – method of promoting safe practice - motivation – communication - role of government agencies and private consulting agencies in safety training – creating awareness, awards, celebrations, safety posters, safety displays, safety pledge, safety incentive scheme,safety campaign – domestic safety and training.	15
IV	**POWDER HANDLING** Powder classification-physical, chemical and other properties- metal powders-other non- metallic powders-handling methods- manual, mechanical, automatic-charging of powders- charge distribution. Metal powders and characterization atomization, types – milling – electro deposition – spray drying, production of iron powder, aluminum powder, titanium – screening and cleaning of metals – explosively and pyrophoricity – toxicity, particle size and size distribution – measurement, types and significance – particle shape analysis- surface area, density, porosity, flow rate – testing. Metal powders, applications as fuel, solid propellants, explosives and pyrotechnics.	15
V	**DUST EXPLOSION** Industrial dust- dust explosion accidents – explosibility characteristics - minimum explosive concentration, minimum ignition energy- explosion pressure characteristics- maximum permissible oxygen concentration. Explicability tests. Hartmann vertical tube apparatus- horizontal tube apparatus- inflammatory apparatus- godbert and greenward furnace. Dust explosion prevention – dust explosion protection – dust explosion venting-	13

	Dust evaluation and control- methodology- measurements – control approaches and strategies – control of dust sources, dust transmission – role of workers.	

Reference Books:

1. Martin Glor, “Electro Static Hazard in Powder Handling” Research studies Press Ltd., England, 1988.
2. Major hazard control-ILO Geneva, 1987.
3. Seminar on “Hazard recognition and prevention in the work place- airborne dust” Vol.1and 2, SRMC, Chennai, 4/5, Sept.2000.
4. ASM Metals hand book, Ninth edition, Vol.7, Powder Metallurgy
5. Accident Prevention Manual for Industrial Operations”, N.S.C.Chicago, 1982
6. Heinrich H.W. “Industrial Accident Prevention” McGraw-Hill Company, New York, 1980.
7. Krishnan N.V. “Safety Management in Industry” Jaico Publishing House, Bombay, 1997.

Board Examination Question Paper Pattern

Time: 3 Hrs

Max.Marks: 100

PART -A Five question will be asked covering all units. All questions are to be answered. Each question carries 1 mark.

PART-B Fifteen questions will be asked covering all the units. Three question from each unit. Answer any ten questions. Each question carries 2marks.

PART-C Five questions will be asked either or type. One question from every unit. Answer either A or B. Each question carries 15 marks. A and B have subdivisions (7+8).

The questions are to be numbered from 1 to 25. All the units are to be covered with equal weight age.

PART A Definitions and statements Question Number 1 to 5	5x1=5 Marks
PART B Short answer questions Question Number 6 to 20	10x2=20 Marks
PART C Descriptive answer type questions (Either A or B) Question Number 21 to 25	5x15=75 Marks
TOTAL	100 Marks

Note: Board Examinations will be Conducted for 100 Marks and converted to 75 Marks.

MODEL QUESTION PAPER

42944 -SAFETY IN PROCESS INDUSTRIES AND POWDER HANDLING

TIME: 3-hrs **MAX.MARKS**:100

PART- A

Answer all Questions. Each Question Carries One Mark 5x1=5

1. Define Safety Inspection.
2. What are the four types evidences?
3. Define motivation.
4. Define toxicity.
5. What are the characteristics of explosibility?

PART-B

Answer any ten questions. Each Question Carries two Mark 10x2=20

6. What is meant by safety organization?
7. Define JSA.
8. Write short notes on safety sampling.
9. What are the principles of accident prevention?
10. What is the cost of accident?
11. What are the functions of investigator?
12. What are the methods of promoting safe practice?
13. What are the methods in training of safety?
14. What is meant by accident rate?
15. State the classification of powder handling.
16. What are the chemical properties of metal powders?
17. State the methods of powder handling.
18. Write short notes dust explosion accidents.
19. What is meant by industrial dust?
20. What are the two types of tests in explicability?

PART-C

Answer all Questions. **5x15=75**

21. A) Briefly explain safety organization.

(OR)

B) Explain Job safety analysis (JSA).

22. A) Briefly explain overall accident investigation process.

(OR)

B) What are the four types of evidences? Explain briefly.

23. A) Explain the methods of training in safety.

(OR)

B) What are the methods of promoting safe practice? Explain briefly

24. A) What is the classification of powder handling? Explain briefly.

(OR)

B) Explain the basic procedure in production of iron powder.

25. A) Explain briefly dust explosion.

(OR)

B) What are the two types of furnace? Explain any one.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42973

Semester V

Subject title : Safety in Oil and Gas Industries **(Elective Theory)**

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester: 16Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
Safety in Oil and Gas Industries	**5**	**80**	**25**	**100**	**100**	**3 Hrs**

***Examination will be conducted for 100 marks and it will be reduced to 75 marks**

Topics and Allocation of Hours

unit	Topics	Hrs
I	Introduction to oil and gas safety	15
II	Methods for performing safety and reliability analysis in oil and gas industry	15
III	Safety measures in offshore oil and gas industry	15
IV	Factors contributing to accidents in the oil and gas industry	15
V	Oil and gas industry accident data and accident data Analysis	13
	Test and Model Exam	07
	Total	80

RATIONALE:

Safety and health management is one of the vital constituents of Oil and Gas industry activities, because most of the operational conditions, chemicals and end products associated with Oil and Gas production are well-known to pose serious safety and health threats to the workers.

OBJECTIVES:

- To explain about the basic oil and gas safety.
- To analyze safety measures in oil and gas safety.
- To analyze safety measures in offshore oil and gas industry
- To describe the factors contributing to accident in oil and gas safety.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**Introduction to oil and gas safety** Introduction-need for safety and safety engineers- safety management principles – product hazard classifications and product safety organization tasks – common causes of work injuries and mechanical injuries- accident causation theories – occupational stress and human error occurrence reasons – consequences of human error and human error classifications – bath tub hazard curve.	15
II	**Methods for performing safety and reliability analysis in oil and gas industry** Introduction- root cause analysis – hazards and operability analysis – technique of operations review – interface safety analysis-job safety analysis – preliminary hazard analysis – failure mode and effect analysis- fault tree analysis – markov method.	15
	Safety measures in offshore oil and gas industry Introduction – offshore industrial sector risk picture – offshore	

III	worker situation awareness concept , studies and their results – offshore industry accident reporting approach and offshore accident related causes – offshore industry accidents- case studies (Mumbai high north platform , piper alpha accident – bohai 2 oil accident – Alexander l. kieland accident – ocean ranger accident – glomar java sea drillship accident- baker drilling barge accident – seacrest drillship accident).	15
IV	**Factors contributing to accidents in oil and gas industry** Introduction- human factors that affect safety in general – organizational factors – group factors – individual factors – categorization of accident related human factors in the industrial sector – categories of human factors accident causation in the oil and gas industry – oil field fatality analysis – recommendation to reduce fatal oil and gas industry accidents.	15
V	**Oil and gas industry accident data and accident data analysis** Introduction- offshore oil and gas industry accident databases and accident data collection sources – (world wide) offshore accident databank –well control incident database – collision database – hydrocarbon release database - Danish energy agency – performance measurement project – international association of oil and gas producers)- onshore and offshore oil and gas industry accident data and analysis- offshore oil and gas rigs accident analysis – failures and lessons learned from landmark offshore oil and gas accidents and corrective measures (prevention – mitigation – emergency – safety management – preparedness and planning – aftermath / restoration – early warning – lesson learning).	13

Reference Books:

1. B.S. Dhillon , Safety and Reliability in the oil and gas industry a practical approach , CRC Press, Taylor and Francis Group 2016.
2. Alireza Bahadori , Personnel Protection and Safety equipment for oil and gas industries ,gulf professional publishing of Elsevier group 2015.
3. Abdul khalique , Basic Offshore Safety , Rutledge 2016.

Board Examination Question Paper Pattern

Time: 3 Hrs

Max.Marks: 100

PART -A Five question will be asked covering all units. All questions are to be answered. Each question carries 1 mark.

PART-B Fifteen questions will be asked covering all the units. Three question from each unit. Answer any ten questions. Each question carries 2marks.

PART-C Five questions will be asked either or type. One question from every unit. Answer either A or B. Each question carries 15 marks. A and B have subdivisions (7+8).

The questions are to be numbered from 1 to 25. All the units are to be covered with equal weight age.

PART A Definitions and statements Question Number 1 to 5	5x1=5 Marks
PART B Short answer questions Question Number 6 to 20	10x2=20 Marks
PART C Descriptive answer type questions (Either A or B) Question Number 21 to 25	5x15=75 Marks
TOTAL	100 Marks

Note: Board Examinations will be Conducted for 100 Marks and converted to 75 Marks.

MODEL QUESTION PAPER

42973-SAFETY IN OIL AND GAS INDUSTRIES

Time: 3 Hrs **Max Marks:** 100

PART – A

5 x 1 = 5

Answer all questions. Each question carries one mark.

1. What is safety?
2. Define fault tree analysis.
3. What is offshore accident awareness?
4. What is accident causation?
5. Define Mitigation.

PART – B

10 x 2 = 20

Answer any TEN Questions. Each Questions Carries two Marks.

6. Briefly explain need for safety.
7. Define accident causation theory.
8. List out human error classifications.
9. What is hazard Evaluation?
10. Define job safety analysis.
11. Define failure mode analysis.
12. What are causes of offshore accident?
13. Define offshore accident.
14. What do you understand acceptable risk?
15. What are the factors to be affecting in safety?
16. Define oil field fatality analysis.
17. What are the factors to consider reducing accidents?
18. Why collecting accident database?
19. What are the energy agencies in international association?
20. Define safety management.

PART – C

5 x 15 = 75

Answer all questions.

21. A) Explain the safety management principles in oil and gas industry.

(OR)

B) Explain about the causes of work injuries and mechanical injuries.

22. A) Explain the concept of operability analysis in oil and gas industries.

(OR)

B) Illustrate about the Markova method in industry.

23. A) How accident scenario is developed for analysis?

(OR)

B) (i) Explain the baker drilling barge accident. (8)

(ii) Explain the seacrest dirllship accident. (7)

24. A) Illustrates about the categorization of accident related human factors.

(OR)

B) Explain the recommendation to reduce fatal oil and gas industry accidents.

Illustrates about the accident data and accident data analysis in oil and gas industries.

(OR)

B) Explain about the onshore and offshore oil and gas industry accident data and analysis.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42954

Semester V

Subject Title : Hazard Identification Practical

TEACHING AND SCHEME OF EXAMINATIONS:

No. of Weeks per Semester: 16 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Hazard Identification Practical	4	64	25	100*	100	3Hrs

***Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

Objectives

- Prepare different types of hazard in a working environment
- Identify the existing safeguards available to control the risks due to the hazards.
- Suggest additional control measures to reduce the risk to acceptable level.
- Prepare a Risk register that will help in continuously monitoring these risks
- Detect any changes and ensure the controls are effective

List of Experiments:

1. Identification of mechanical Hazard in a Working environment
2. Identification of Physical Hazard in a Working environment.
3. Identification of Chemical Hazard in a Working environment
4. Identification of Electrical Hazard in a Working environment
5. Identification of Fire Hazard in a Working environment
6. Identification of manual Material handling Hazard in a Working environment.
7. Identification of Mechanical material handling Hazard in a Working environment
8. Identification of Hazard in a Movement of people and vehicles in a working environment.
9. Identification of Biological Hazard in a Working environment.
10. Identification of psychological hazard in a Working environment.

List of Equipments / DATA (for a batch of 30 Students)

- Forms relevant for Hazard identification and recording: Appropriate Industrial visits, visual media

BOARD EXAMINATION

DETAILED ALLOCATION OF MARKS

Internal Mark

Note: All the students should maintain the observation note book/ manual as per the regulation..

Observation - 10 Marks
Record work - 10 Marks
Attendance -05 Marks
Total -25 Marks

Board Examination

Note: All the exercises have to be completed. All the exercises should be given in the question paper and students are allowed to select by a lot.
Record note book should be submitting during examination

ALLOCATION OF MARKS

Aim/Procedure/Material preparation/ Arrangements	-	30
Demonstration/ Flow chart/Data analysis	-	35
Result and discussion	-	25
Viva-Voce	-	10
Total marks	**-**	**100**

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42955

Semester IV

Subject Title : Computer Aided Risk Analysis Practical

TEACHING AND SCHEME OF EXAMINATIONS:

No. of Weeks per Semester: 16 Weeks

Subject	Instruction		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Computer Aided Risk Analysis Practical	4	64	25	100*	100	3Hrs

***Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

Objectives

- Preparation of even tree analysis
- Identify Safety Risk Assessment
- Preparation of Inspection of facility / equipment
- Identification of Cause- and- Effect Analysis
- Preparation of Maintenance Management System

List of Experiments:

1. Performance of Event tree Analysis (ETA)
2. Performance of Event tree Analysis (FTA)
3. Performance of Failure Mode Effect Analysis (FMEA)
4. Performance of Air Hazard Modeling
5. Performance of Safety Risk Assessment.
6. Performance of Cause- and- Effect Analysis.
7. Execution of work Permit Management System
8. Execution of Incident Reporting
9. Execution of Inspection of facility / equipment.
10. Execution of Maintenance Management System

List of Equipments / DATA (for a batch of 30 Students)

- Open-Source FTA Software
- Open-source Air Hazard Modeling Software
- Open-source Safety Risk Assessment Software
- Open-source Cause-and-effect Analysis
- Open-source of work permit management software
- Open-source Incident reporting software
- Open-source Inspection software
- Open-source Maintenance Management software

BOARD EXAMINATION

DETAILED ALLOCATION OF MARKS

Internal Mark

Note: All the students should maintain the observation note book/ manual as per the regulation.

Observation - 10 Marks
Record work - 10 Marks
Attendance -05 Marks
Total -25 Marks

Board Examination

Note: All the exercises have to be completed. All the exercises should be given in the question paper and students are allowed to select by a lot.
Record note book should be submitting during examination

ALLOCATION OF MARKS

Aim/Procedure/Material preparation/ Arrangements	-	30
Demonstration/ Flow chart/Data analysis	-	35
Result and discussion	-	25
Viva-Voce	-	10
Total marks	**-**	**100**

STATE BOARD OF TECHNICAL EDUCATION & TRAINING,TAMILNADU.

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N-SCHEME

(Implements from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42974

Semester V

Subject Title : Manufacturing Safety Practical **(Elective Practical)**

TEACHING AND SCHEME OF EXAMINATIONS:

No. of Weeks per Semester: 16 Weeks

Subject	Instruction		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Manufacturing Safety Practical	4	64	25	100*	100	3Hrs

***Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

Objectives

- Preparation of hazard prevailing in a Foundry
- Identify the tools used in hazard prevailing in a different areas like metal cutting, welding etc.,
- Prepare safety tools used in Compressed Gas Cylinder in manufacturing Industry
- Prepare Personal protective equipment relevant to various manufacturing process.

List of Experiments:

1. Study on the hazard prevailing in a Foundry
2. Demonstration on the hazard prevailing in Metal cutting.
3. illustration on the Hazard prevailing in welding
4. Study on the Hazard related to Mechanical machinery.
5. Demonstration on fixed guards.
6. Demonstration on Adjustable guards.
7. Study of the principle of interlocking guards.
8. Safety in the use of Compressed Gas Cylinder in manufacturing Industry.
9. Demonstration on welding fume extraction system.
10. Study on Personal protective equipment relevant to various manufacturing process.
11. Carry out a job safety analysis for the given industrial processes.
12. Analyze the ergonomic risk factors of the sewing workers using REBA

List of Equipments / DATA (for a batch of 30 Students)

- Machine Guarding models
- Job Safety analysis worksheet
- Ergonomic analysis- RULA ,REBA worksheet
- Inch tape and stop watch (if motion study is done)
- Appropriate industrial visits; Visual media
- Fume extractor, appropriate industrial visits, visual media
- PPE's like Goggles, Safety Shoes, helmet, Gloves, Appropriate industrial visits, Visual media

BOARD EXAMINATION

DETAILED ALLOCATION OF MARKS

Internal Mark

Note: All the students should maintain the observation note book/ manual as per the regulation.

Observation - 10 Marks
Record work - 10 Marks
Attendance -05 Marks
Total -25 Marks

Board Examination

Note: All the exercises have to be completed. All the exercises should be given in the question paper and students are allowed to select by a lot.
Record note book should be submitting during examination

ALLOCATION OF MARKS

Aim/Procedure/Material preparation/ Arrangements	-	30
Demonstration/ Flow chart/Data analysis	-	35
Result and discussion	-	25
Viva-Voce	-	10
Total marks	**-**	**100**

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42975

Semester : V

Subject Title : Chemical Safety Practical **(Elective Practical)**

TEACHING AND SCHEME OF EXAMINATIONS:

No. of Weeks per Semester: 16 Weeks

Subject	Instruction		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Chemical Safety Practical	4	64	25	100*	100	3Hrs

***Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

Objectives

- Identify the different types of chemical substances
- Prepare Material safety data sheet
- Preparation of handling and storage of various metals, toxic gases and industrial chemicals
- Identify the routes of entry of chemical into human body
- Prepare the products and industrial utilizing toxic chemicals

List of Experiments:

1. Study on the types of chemical substances (Harmful, irritant, Corrosive, Toxic, and Carcinogenic).
2. Reading and Interpretation of Material safety data sheet.
3. Demonstration on the Hierarchy of Control Measures.
4. Safety in handling and storage of heavy metals.
5. Safety in handling and storage of toxic gases.
6. Safety in handling and storage of industrial chemicals.
7. Study on the Exposure limits of toxic chemicals.
8. Study on the routes of entry of chemical into human body.
9. Study on the products and industrial utilizing toxic chemicals.
10. Personal protective equipments for chemical safety.
11. Determine the obnoxious gases present in the vessel using multi Gas Detector. Also determine Flammability Levels.
12. Study the use of Chemical safety and Eye wash shower.

LIST OF EQUIPMENTS/ DATA (for a batch of 30 Students)

- Material safety data sheet, hazardous chemicals handbook
- Material safety data sheet
- Posters and real-world examples(like measures taken for COVID-19)
- Material safety data sheet, hazardous chemicals handbook
- Industrial visits, Industrial product data
- Equipment for respiratory protection, hand skin protection, eye protection, protective clothing.
- Multi Gas Detector
- Chemical Safety and Eye wash shower
- Eye wash Cup
- Friction Sensitiveness Tester.

BOARD EXAMINATION

DETAILED ALLOCATION OF MARKS

Internal Mark

Note: All the students should maintain the observation note book/ manual as per the regulation.

Observation - 10 Marks
Record work - 10 Marks
Attendance -05 Marks
Total -25 Marks

Board Examination

Note: All the exercises have to be completed. All the exercises should be given in the question paper and students are allowed to select by a lot.
Record note book should be submitting during examination

ALLOCATION OF MARKS

Aim/Procedure/Material preparation/ Arrangements	-	30
Demonstration/ Flow chart/Data analysis	-	35
Result and discussion	-	25
Viva-Voce	-	10
Total marks	**-**	**100**

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42976

Semester V

Subject Title : Environmental Safety Practical **(Elective Practical)**

TEACHING AND SCHEME OF EXAMINATIONS:

No. of Weeks per Semester: 16 Weeks

Subject	Instruction		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Environmental Safety Practical	4	64	25	100*	100	3Hrs

***Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

Objectives

- Preparation of air quality index chart
- Demo of biological oxygen demand and chemical oxygen demand of water
- Identify the total Dissolved solid (TDS) in water
- Study of water Hardness
- Identification of dust particles in a working environment
- Preparation of Environment Impact assessment (EIA) of a Process

List of Experiments:

1. Measurement for air quality index (AQ1) of an environment.
2. Demonstration of biological oxygen demand (BOD) of water
3. Demonstration of chemical oxygen demand (COD) of water
4. Measurement of total Dissolved solid (TDS) in water
5. Measurement of water Hardness
6. Measurement of particulate substance in welding fumes.
7. Measurement of dust particles in a working environment.
8. Study on the working of Electrostatic precipitator.
9. Identification of municipal solid wastes.
10. Environment Impact assessment (EIA) of a Process.
11. Find out the illumination level of the following places using lux meter. 1. Classroom 2.computer lab 3. Workshop 4. Seminar hall 5. Parking lot .compare and comment on the observed level with the international codes
12. Find out the noise level of each motor in the Electrical lab. Calculate the TWAN value.

LIST OF EQUIPMENTS / DATA (for a batch of 30 Students)

- Particulate matter sensor, Air Quality Measurement Kit
- BOD apparatus, pipette, Burette, Conical flask, vial, regards.
- COD apparatus, pipette, Burette, Conical flask, vial, regards.
- TDS meter, Water samples from various sources
- Water hardness meter, water samples from various sources
- Fume filters, sensitive weighing balance
- Dust collector , sensitive weighing balance
- BIS Standard on Electrostatic precipitator (IS9254, IS 10919)
- Industrial Visit, Site Visit, Visual Media
- Standard forms related to Environmental impact assessment
- Sound level meter (direct reading)
- Sound level meter (computer connected)
- Lux meter

BOARD EXAMINATION

DETAILED ALLOCATION OF MARKS

Internal Mark

Note: All the students should maintain the observation note book/ manual as per the regulation.

Observation - 10 Marks
Record work - 10 Marks
Attendance -05 Marks
Total -25 Marks

Board Examination

Note: All the exercises have to be completed. All the exercises should be given in the question paper and students are allowed to select by a lot.
Record note book should be submitting during examination

ALLOCATION OF MARKS

Aim/Procedure/Material preparation/ Arrangements	-	30
Demonstration/ Flow chart/Data analysis	-	35
Result and discussion	-	25
Viva-Voce	-	10
Total marks	**-**	**100**

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42977

Semester V

Subject Title : Entrepreneurship and Startup Practical

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester: 16Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
Entrepreneurship and Startup practical	**4**	**64**	**25**	**100***	**100**	**3 Hrs**

***Examination will be conducted for 100 marks and it will be reduced to 75 marks**

Topics and Allocation of Hours

unit	Topics	Hrs
I	Entrepreneurship-Introduction and process	12
II	Business idea and Banking	12
III	Start Ups, E-cell and success Stories	12
IV	Pricing and cost Analysis	12
V	Business plan preparation	12
	Revision	04
	Total	64

RATIONALE:

Development of a diploma curriculum is a dynamic process responsive to the society and reflecting the needs and aspiration of its learners. Fast changing society deserves changes in educational curriculum particularly to establish relevance to emerging

socioeconomic environments, to ensure equity of opportunity and participation and finally promoting concern for excellence. In this context the course on entrepreneurship and startups aims at instilling and stimulating human urge for excellence by realizing individual potential for generating and putting to use the inputs, relevant to social prosperity and thereby ensure good means of living for every individual, provides jobs and develop Indian economy.

OBJECTIVES

The students will be able to

- Excite the students about entrepreneurship
- Acquiring Entrepreneurial spirit and resourcefulness
- Understanding the concept and process of entrepreneurship
- Acquiring entrepreneurial quality, competency and motivation
- Learning the process and skills of creation and management of entrepreneurial
- venture Familiarization with various uses of human resource for earning dignified means of
- living Know its contribution in and role in the growth and development of individual and the
- nation Understand the formation of E-cell
- Survey and analyze the market to understand customer needs
- Understand the importance of generation of ideas and product selection
- Learn the preparation of project feasibility report
- Understand the importance of sales and turnover
- Familiarization of various financial and nonfinancial schemes
- Aware the concept of incubation and starts ups

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**ENTREPRENEURSHIP – INTRODUCTION AND PROCESS** Concept, Functions and Importance - Myths about Entrepreneurship - Pros and Cons of Entrepreneurship - Process of Entrepreneurship - Benefits of Entrepreneur - Competencies and characteristics - Ethical Entrepreneurship - Entrepreneurial Values and Attitudes – Motivation – Creativity – Innovation - Entrepreneurs	12

	- as problem solvers - Mindset of an employee and an entrepreneur - Business Failure – causes and remedies - Role of Networking in entrepreneurship	
II	**BUSINESS IDEA AND BANKING** Types of Business: Manufacturing, Trading and Services. Stakeholders: sellers, vendors and consumers and Competitors. E-Commerce Business Models. Types of Resources - Human, Capital and Entrepreneurial tools and resources. Selection and utilization of human resources and professionals, etc. Goals of Business; Goal Setting - Patent, copyright and Intellectual property rights - Negotiations - Importance and methods - Customer Relations and Vendor Management. Size and capital based classification of business enterprises - Various sources of Information - Role of financial institutions - Role of Government policy - Entrepreneurial support systems - Incentive schemes of state government - Incentive schemes of Central government.	12
III	**START UPS, E-CELL AND SUCCESS STORIES** Concept of Incubation center's -, financial - institutions and other relevance institutions - Success Visit and report of DIC stories of Indian and global business legends - Field Visit to MSME's - Study visit to Incubation centers and start ups - Learn to earn- Startup and its stages - 10. May 2021 128 Role of Technology – E-commerce and Social Media - Role of E-Cell - E-Cell to Entrepreneurship.	12
IV	**PRICING AND COST ANALYSIS** Unit of Sale, Unit Price and Unit Cost - for single product or service - Types of Costs - Start up, Variable and Fixed - Income Statement - Cash flow Projections - Break Even Analysis - for single product or service – Taxes - Financial Business Case Study - Understand the meaning and concept of the term Cash Inflow and Cash Outflow – Price - Calculate Per Unit Cost of a single product - Operational Costs - Understand the importance and preparation of Income Statement - Prepare a Cash Flow Projection – Projections - Pricing and Factors affecting pricing. Launch Strategies after	12

	pricing and proof of concept	
V	**BUSINESS PLAN PREPARATION** Generation of Ideas. - Business Ideas vs. Business Opportunities - Opportunity Assessment – Factors, Micro and Macro Market. Environment - Selecting the Right Opportunity - Product selection - New product development and analysis - Feasibility Study Report – Technical analysis, financial analysis and commercial analysis - Market Research - Concept, Importance and Process - Market Sensing and Testing - Marketing and Sales strategy - Digital marketing - Branding - Business name, logo, tag line - Promotion strategy - Business Plan Preparation - Social Entrepreneurship as Problem - Solving - Concept and Importance - Risk Taking - Concept - Types of business risks - Execution of Business Plan	12

Reference Books:

1. Dr. G.K. Varshney, Fundamentals of Entrepreneurship, Sahitya Bhawan Publications, Agra – 282002
2. Dr. G.K. Varshney, Business Regulatory Framework , Sahitya Bhawan Publications, Agra – 282002
3. Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, Entrepreneurship , McGraw Hill (India) Private Limited, Noida - 201301
4. M.Scarborough, R.Cornwell, Essentials of Entrepreneurship and small business management, Pearson Education India, Noida - 201301
5. Charantimath Poornima M, Entrepreneurship Development and Small Business Enterprises, Pearson Education, Noida – 201301
6. Trott, Innovation Management and New Product Development, Pearson Education, Noida – 201301
7. M N Arora, A Textbook of Cost and Management Accounting, Vikas Publishing House Pvt. Ltd., New Delhi-110044
8. Prasanna Chandra, Financial Management, Tata McGraw Hill education private limited.
9. V. Trivedi, Renu Jatana, Indian Banking System, RBSA Publishers, Rajasthan.
10. Simon Daniel, HOW TO START A BUSINESS IN INDIA, BUUKS, Chennai - 600018
11. Ramani Sarada, The Business Plan Write-Up Simplified - A practitioners guide to writing the Business Plan, Notion Press Media Pvt. Ltd., Chennai 600095.

Board Examination – Evaluation Pattern

Internal Mark Allocation

Assignment (Theory portion)*	- 10
Seminar Presentation #	- 10
Attendance	- 5
Total	- 25

Note: * Three assignments should be submitted. The same must be evaluated and converted to 10 marks.

Assignment 1 (Unit I & II)	- 6 Five marks question
Assignment 2 (Unit III & IV)	- 6 Five marks question
Assignment 3 (All Units)	- 6 Five marks question

Student should prepare and present in any two topic from the subject. The report should be submitted for the Board Examination in a hard bound book.

Suggested Topics (Case Study Report)

- Incentive schemes of government
- Field Visit to MSME's
- Field visit to Incubation centers and start-ups
- Case study report of the Financial Business.
- Market Research
- New Product Feasibility Study Report
- E- commerce Business Models
- Business Plan Preparation
- Social Entrepreneurship
- Digital marketing
- Visit report of DIC
- Visit report of financial institution
- Intellectual property rights
- Learn and Earn

BOARD EXAMINATION

1. The students should be taught all five units. The proper exposure and field visit should be arranged. All the portions should be completed before examinations.
2. The students should maintain theory assignment and seminar presentation. The case study report should be submitted during the Board Practical Examinations.
3. The question paper consists of theory questions and presentation report (case study).

Detailed Allocation of Marks

Theory questions	- 40
Case Study report	- 30
Presentation/Viva voce	- 30
Total	- 100

For theory questions:

Ten questions will be asked by selecting two questions from each unit. Answer any eight questions for 40 Marks. Each question carries five marks.

For case study report:

Individual students report should be evaluated for 25 Marks. The student should prepare a presentation about his report and the same will be evaluated for 35 marks through viva voce by the external examiner.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42961

Semester VI

Subject title : Regulations for safety, Health and Environment

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester: 16Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
Regulations for safety, Health and Environment	**5**	**80**	**25**	**100***	**100**	**3 Hrs**

***Examination will be conducted for 100 marks and it will be reduced to 75 marks**

Topics and Allocation of Hours

unit	Topics	Hrs
I	Factories Act, 1948	15
II	Environment Act, 1986	15
III	Manufacture, Storage and Import of Hazardous Chemical Rules, 1989	15
IV	Other Acts and Rules	15
V	International Acts and Standards	13
	Test and Model Exam	07
	Total	80

RATIONALE:

Safety rules are in place to protect the people of our community. They protect all of us. The Occupational Safety and Health Act was enacted into law in response to a sharp increase in the number and severity of workplace injuries. The law mandates safe working conditions for employees

OBJECTIVES:

- To explain about the Factories acts and environment acts.
- To describe the industry working conditions.
- To understand the Manufacture, Storage & Import of Hazardous Chemical Rules.
- To know the international acts and standards.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**FACTORIES ACT, 1948** Statutory authorities – inspecting staff, health, safety, provisions relating to hazardous processes- welfare, working hours, employment of young person's – special provisions – penalties and procedures- Tamilnadu factories rules 1950 under safety and health chapters of factories Act 1948.	15
II	**ENVIRONMENT ACT- 1986** General powers of the central government, prevention, control and abatement of environmental pollution- biomedical waste (management and handling rules, 1989- the noise pollution regulation and control) rules 2000- the batteries (management and handling rules) 2001- No objection certificate from statutory authorities like pollution control board. air Act 1981 and water Act 1974: central and state boards for the prevention and control of air pollution-powers and functions of boards – prevention and control of air pollution and water pollution – fund – accounts and audit, penalties and procedures.	15

III	**MANUFACTURE, STORAGE AND IMPORT OF HAZARDOUS CHEMICAL RULES, 1989** Definitions – duties of authorities – responsibilities of occupier – notification of major accidents – information to be furnished – preparation of offsite and onsite plans – list of hazardous and toxic chemicals – safety reports – safety data sheets.	15
IV	**OTHER ACTS & RULES** Indian Boiler Act 1923, static and mobile pressure vessel rules (SMPV), motor vehicle rules, mines Act 1952, workman compensation act and rules – electricity act and rules – hazardous wastes (management and handling) rules1989 with amendments In 2000- the building and other construction workers act 1996- petroleum rules- gas cylinder rules-explosives act 1983-pesticides act.	15
V	**INTERNATIONAL ACTS & STANDARDS** Occupational safety and health Act Of USA (The william- steiger Act Of 1970) – health and safety work Act (HASAWA 1974, UK) – OSHAS 18000 – ISO 14000 – American national standards institute (ANSI).	13

Reference Books:

1. The Factories Act 1948, Madras Book Agency, Chennai, 2000
2. The Environment Act (Protection) 1986, Commercial Law Publishers (India) Pvt.Ltd., New Delhi.
3. Water (Prevention and control of pollution) act 1974, Commercial Law publishers (India) Pvt.Ltd., New Delhi.
4. Air (Prevention and control of pollution) act 1981, Commercial Law Publishers (India) Pvt.Ltd., New Delhi.
5. The Indian boilers act 1923, Commercial Law Publishers (India) Pvt.Ltd., Allahabad.
6. The Mines Act 1952, Commercial Law Publishers (India) Pvt.Ltd., Allahabad.
7. The manufacture, storage and import of hazardous chemical rules 1989, Madras

Board Examination Question Paper Pattern

Time: 3 Hrs

Max.Marks: 100

PART -A Five question will be asked covering all units. All questions are to be answered. Each question carries 1 mark.

PART-B Fifteen questions will be asked covering all the units. Three question from each unit. Answer any ten questions. Each question carries 2marks.

PART-C Five questions will be asked either or type. One question from every unit. Answer either A or B. Each question carries 15 marks. A and B have subdivisions (7+8).

The questions are to be numbered from 1 to 25. All the units are to be covered with equal weight age.

PART A Definitions and statements Question Number 1 to 5	5x1=5 Marks
PART B Short answer questions Question Number 6 to 20	10x2=20 Marks
PART C Descriptive answer type questions (Either A or B) Question Number 21 to 25	5x15=75 Marks
TOTAL	100 Marks

Note: Board Examinations will be Conducted for 100 Marks and converted to 75 Marks.

MODEL QUESTION PAPER

42961-REGULATIONS FOR SAFETY, HEALTH AND ENVIRONMENT

TIME: 3 Hrs **MAX. MARKS**: 100

PART- A

Answer all Questions. Each Question Carries One Mark 5x1=5

1. What is meant by statutory authorities?
2. What is meant by environment pollution?
3. Define duties of authorities.
4. State Indian Boiler Act 1923.
5. Write any one international act for health.

PART- B

Answer any ten questions. Each Question Carries two Mark 10x2=20

6. What are the main provisions prescribed by Factories Act-1948?
7. What are the safety provisions relating to hazardous processes?
8. Write any two penalties and procedures for Factories Act-1948.
9. Write any two rules of biomedical waste management and handling.
10. Write any two prevention and control of air pollution.
11. Write any two penalties of accounts and audit.
12. State the any two duties of authorities.
13. What are the main notifications of major accidents?
14. List the any two hazardous and toxic chemicals.
15. What are the various rules in static pressure vessel of boiler act?
16. State the any two rules of an electricity act.
17. Write any two rules of explosives act 1983.
18. State the various types of International Acts & Standards.
19. What are the objectives of health and safety work Act.
20. What is ANSI?

PART-C

Answer all Questions. **5x15=75**

21. A) i) Explain statutory authorities. (7)

ii) State the important provisions of factories act 1948 governing safety and health of Workers. (8)

(OR)

B) i) State the special provisions, penalties and procedures of factories act 1948. (7)

ii) State the important provisions of tamilnadu factories rules 1950 under safety and health chapters of factories Act 1948. (8)

22. A) i) Explain the factors of General Powers of the central government, prevention, control and Abatement of environmental pollution (7)

(ii) Explain the rules of biomedical waste management and handling. (8)

(OR)

B) i) Explain the factors of air Act 1981 and water Act 1974 (7)

ii) Explain the procedures of accounts and audit. (8)

23. A) i) Explain the term duties of authorities. (7)

ii) Briefly explain responsibilities of occupier. (8)

(OR)

B) i) Explain what are the main notification of major accidents. (7)

ii) Explain the list of hazardous and toxic chemicals in industry. (8)

24. A) i) Explain the procedure of Indian Boiler Act 1923 (7)

ii) Explain the procedure of motor vehicle rules for mines Act 1952 (8)

(OR)

B) i) What are the main functions of hazardous wastes (management and handling) Rules1989 with amendments in 2000 (8)

ii) Explain about explosives act 1983 (7)

25. A) i) Explain about Occupational safety and health Act of USA (8)

ii) Explain about health and safety work Act (7)

(OR)

B) i) Explain about OSHAS 18000 – ISO 14000 (7)

ii) Explain about American national standards institute (ANSI). (8)

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42962

Semester VI

Subject title : Disaster Management

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester: 16Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
Disaster Management	**5**	**80**	**25**	**100***	**100**	**3 Hrs**

***Examination will be conducted for 100 marks and it will be reduced to 75 marks**

Topics and Allocation of Hours

unit	Topics	Hrs
I	Philosophy of Disaster management	15
II	Technological Disasters	15
III	Sustainable Development	15
IV	Offshore and onshore drilling	15
V	Environmental education	13
	Test and Model Exam	07
	Total	80

RATIONALE:

Disaster Management ensures the safety of people during the times of emergency, and natural and man-made calamity. These strategies help in preventing or minimizing losses caused due to these disasters.

OBJECTIVES:

- To explain about the Philosophy of Disaster management.
- To explain the technological disasters and sustainable development.
- To describe the offshore and onshore drilling.
- To understand environmental education.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**PHILOSOPHY OF DISASTER MANAGEMENT** Introduction- disaster mitigation-hydrological, coastal and marine disasters-atmospheric disasters- geological, meteorological phenomena- mass movement and land disasters- forest related disasters- wind and water related disasters-use of space technology for the control of geological disasters.	15
II	**TECHNOLOGICAL DISASTERS** Introduction- Case studies of technological disasters with statistical details- emergencies and control measures- APELL-onsite and offsite emergencies- crisis management groups- emergency centers and their functions throughout the country- software's on emergency controls- monitoring devices for detection of gases in the atmosphere.	15
III	**SUSTAINABLE DEVELOPMENT** Introduction - sustainable development- bio diversity-atmospheric pollution- global warming and ozone depletion-ODS banking and phasing out- sea level rise-El Nino and climate changes-Eco friendly products-Green movements- green philosophy-environmental policies- environmental impact assessment-case studies-life cycle.	15
IV	**OFFSHORE AND ONSHORE DRILLING** Introduction - offshore and onshore drilling-control of fires-case studies-marine pollution and control- toxic, hazardous and nuclear wastes-state of India's and global environmental issues-	15

	carcinogens- complex emergencies- earthquake disasters- extreme event analysis-.	
V	**ENVIRONMENTAL EDUCATION** Introduction- environmental education-population and community ecology- conservation of natural resources - environmental protection and law- research methodology and systems analysis- policy initiatives and future prospects-risk assessment process, assessment for different disaster types- assessment data use, destructive capacity-risk adjustment-choice-loss acceptance-disaster aid- public liability insurance-stock taking and vulnerability analysis-disaster profile of the country-national policies-objectives and standards-physical event modification-preparedness, forecasting and warning, land use planning.	13

Reference Books:

1. Introduction to Environmental Engineering and Science, Gilbert, M. Masters
2. Environmental Science, Miller, G. Tylor
3. Principles of Environmental Science and Engineering, R. Sivakumar.
4. Disaster management – Narayanan
5. Disaster management and preparedness- Larry Collins\.
6. R.B.Singh(Ed) “Disaster management” Rawat Publication, new delhi,2000
7. H.K.Gupta (Ed) “Disaster management” Universities press, India,2003
8. http://www.unep.fr/scp/sp

Board Examination Question Paper Pattern

Time: 3 Hrs

Max.Marks: 100

PART -A Five question will be asked covering all units. All questions are to be answered. Each question carries 1 mark.

PART-B Fifteen questions will be asked covering all the units. Three question from each unit. Answer any ten questions. Each question carries 2marks.

PART-C Five questions will be asked either or type. One question from every unit. Answer either A or B. Each question carries 15 marks. A and B have subdivisions (7+8).

The questions are to be numbered from 1 to 25. All the units are to be covered with equal weight age.

PART A Definitions and statements Question Number 1 to 5	5x1=5 Marks
PART B Short answer questions Question Number 6 to 20	10x2=20 Marks
PART C Descriptive answer type questions (Either A or B) Question Number 21 to 25	5x15=75 Marks
TOTAL	100 Marks

Note: Board Examinations will be Conducted for 100 Marks and converted to 75 Marks.

MODEL QUESTION PAPER

42962-DISASTER MANAGEMENT

TIME: 3 Hrs **MAX MARKS:** 100

PART-A

Answer all questions. Each question carries one mark. 5x1=5

1. What is a disaster?
2. What is a technological disaster?
3. What is a sustainable development?
4. What is an onshore drilling?
5. What is an environmental education?

PART-B

Answer any ten questions. Each Question Carries two Marks. 10x2=20

6. Name the categories of disasters.
7. What is a forest disaster?
8. What are the types of technology's for control of geological disaster?
9. Write the case study man-made disaster?
10. Write the types of case study of technological disaster?
11. What are the types of monitoring devices used in technological disaster?
12. What are the types of atmospheric pollution?
13. Define the term global warming.
14. Define the term life cycle
15. What are the controls of fires?
16. Define marine pollution.
17. What is mean by global environment issue?
18. List the types of disasters.
19. What is disaster preparedness?
20. Define the term risk assessment.

PART-C

Answer all questions. **5x15=75**

21. A) i) Explain the causes, classification and types of forest fire. (8)

ii) List the Do's and Don'ts during various types of disaster. (7)

(OR)

B) i) What are the different types of natural disasters? Explain in detail. (8)

ii) Explain in detail about a wind and water related disaster. (7)

22. A) i) Elaborate in detail about case study of technological disasters with statical Details. (7)

ii) Explain APELL. (8)

(OR)

B) i) Explain the functions of emergency centers throughout the country. (8)

ii) Explain types of monitoring devices for detection of gases in the atmosphere (8)

23. A) i) Write a brief note on atmospheric pollution. (7)

ii) Write in detail about global warming and ozone depletion. (8)

(OR)

B) i) Explain in brief effect of El Nino. (7)

ii) Brief about green philosophy. (8)

24. A) i) Explain in detail about offshore and onshore drilling. (7)

ii) Write the case study of control of fire? (8)

(OR)

B) i) Write a brief note on nuclear wastage. (7)

ii) Write in detail about the state of India's and global environmental issues. (8)

25. A) i) Explain in detail about environmental education research methodology. (8)

ii) Describe various disaster preparedness strategies. (7)

(OR)

B) i) Summarize the risk assessment types and steps involved in it. (7)

ii) Elaborate the importance and categories of disaster damage assessment. (8)

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42981

Semester VI

Subject title : Safety in Material Handling **(Elective Theory)**

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester: 16Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
Safety in Material Handling	**5**	**80**	**25**	**100***	**100**	**3 Hrs**

***Examination will be conducted for 100 marks and it will be reduced to 75 marks**

Topics and Allocation of Hours

unit	Topics	Hrs
I	Manual material handling	15
II	Cranes	15
III	Derricks, Conveyors, Hoists & Vehicles	15
IV	Rigging	15
V	Industrial trucks	13
	Test and Model Exam	07
	Total	80

RATIONALE:

Several studies have shown that majority of accidents occur during material transfers involving MHE. Further, human factors also play a vital role in the accidents caused with MHE. A safety management system provides a systematic way to identify hazards and control risks.

OBJECTIVES:

- To explain about the manual material handling.
- To describe the industry working cranes, Derricks, Conveyors, and Hoists & Vehicles.
- To understand about the rigging and industrial trucks..

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**MANUAL MATERIAL HANDLING** Preventing common injuries- lifting by hand- team lifting and carrying- handling specific shape machines and other heavy objects –accessories for manual handling, hand tools, jacks, hand trucks, dollies and wheel barrows –storage of specific materials - problems with hazardous materials, liquids, solids –storage and handling of cryogenic liquids -shipping and receiving, stock picking, dock boards, machine and tools, steel 199 strapping and sacking, glass and nails, pitch and glue, boxes and cartons and car loading –personal protection –ergonomic and safety considerations.	15
II	**CRANES** Types of cranes-reasons for crane accidents: power line contact, overloading, failure to use outriggers-load control-wire rope requirements-annual inspections-preventive maintenance-lifting tools & tackles-structural failure, two blocking, pinch point, moving parts, unsafe hooks, obstruction of vision, sheave caused cable damage, cable kinking, side pull, boom buckling, access, control confusion, turntable failure, removal of counter weight systems-pre	15

	lifting plan-job hazard analysis-hand signals-signaling devices-lifting capabilities-third party inspection-safe load indicator.	
III	**DERRICKS, CONVEYORS, HOISTS & VEHICLES** Derricks- Types of derricks- load ratings- inspections- testing-maintenance-handling the load- guard- operating near power lines-floating cranes. Conveyors- gravity or inertia conveyors-guidelines for using motorized or powered conveyors - conveyor regulations- conveyor safety. Hoists- Inspections-load testing-controls for hoist-moving a load-hoist limit switch- base mounted drum hoist- materials hoist-overhead hoist. Vehicles- highway trucks- off road vehicles -railroad cars.	15
IV	**RIGGING** Rigging and rigger-types of slings-size-weight and centre of gravity of the load-number of legs and angle-removal from service-selection of wire rope sling-strength, fatigue, abrasive wear, abuse-rated capacity of the sling-safe use and maintenance-chain slings-wire rope slings-rope lay-wire rope life-field lubrication-storage-U bolts-metal mesh slings-fiber rope and synthetic web slings-hooks and shackles.	15
V	**INDUSTRIAL TRUCKS** Powered industrial trucks- requirements- operating principles-operators selection, training and performance test- inspection and maintenance- electric trucks- gasoline operated trucks- LPG trucks –power elevators- types of drives- hoist way and machine room emergency procedure- requirements for the handicapped- types-Escalator- safety devices and brakes- moving walks –man lifts, construction, brakes, inspection -ergonomic and safety consideration.	13

Reference Books:

1. Apple .M. James, Plant layout and material handling, 3rdedition, John Wiley and sons, 1991.
2. Fred E. Meyers and Matthew P. Stephens, “Manufacturing Facilities Design and Material Handling”, Prentice Hal, 3rdedition, 2004.
3. Encyclopedia of occupational safety and health, ILO Publication, 1985.
4. Accident prevention manual for industrial operations, N.S.C., Chicago, 1982.
5. Alexandrov. M.P., Material handling equipment, Mir Publishers, Moscow, 1981.
6. Spivakosky, Conveyors and related Equipment, Vol.I and II Peace Pub. Moscow,

Board Examination Question Paper Pattern

Time: 3 Hrs

Max.Marks: 100

PART -A Five question will be asked covering all units. All questions are to be answered. Each question carries 1 mark.

PART-B Fifteen questions will be asked covering all the units. Three question from each unit. Answer any ten questions. Each question carries 2marks.

PART-C Five questions will be asked either or type. One question from every unit. Answer either A or B. Each question carries 15 marks. A and B have subdivisions (7+8).

The questions are to be numbered from 1 to 25. All the units are to be covered with equal weight age.

PART A Definitions and statements Question Number 1 to 5	5x1=5 Marks
PART B Short answer questions Question Number 6 to 20	10x2=20 Marks
PART C Descriptive answer type questions (Either A or B) Question Number 21 to 25	5x15=75 Marks
TOTAL	100 Marks

Note: Board Examinations will be Conducted for 100 Marks and converted to 75 Marks.

MODEL QUESTION PAPER

42944-SAFETY IN MATERIAL HANDLING (Elective)

TIME: 3 Hrs **MAX MARKS:** 100

PART-A

Answer all Questions. Each Question Carries One Mark. 5x1=5

1. What is stock picking?
2. What is preventive maintenance?
3. What is the use of hoists?
4. State the function of shackle.
5. Mention the purpose of elevators.

PART-B

Answer any ten questions. Each Question Carries two Mark 10x2=20

6. How do you preventing common injuries?
7. State any two personal protections.
8. What are hazardous materials?
9. State the types of cranes.
10. What are the failures to use ocetriggers?
11. What is safe load indicator?
12. Mention the types of derricks?
13. What do you mean by inertia conveyors?
14. What is function of hoist limit switch?
15. What is fatigue?
16. What is the use of U bolt?
17. State the functions of rigger?
18. State the types of drives
19. What are the types of elevator?
20. What are selection requirement of industrial trucks?

PART-C

Answer all Questions. **5x15=75**

21. A) i) How do you preventing common injuries. (7)

ii) What are the accessories for manual handling? (8)

(OR)

B) i) what are common problems when handling of liquid and solids.(7)

ii) Explain ergonomic and safety consideration. (8)

22. A) i) Explain annual inspections and preventive maintenance of wire rope. (8)

ii) Explain any two lifting tools and tackles with sketch? (7)

(OR)

B) i) Explain signaling devices and safe load indicator. (8)

ii) Explain job hazard analysis. (7)

23. A) i) Explain the inspection procedures and testing maintenance of derricks.(8)

iii) What are the guidelines for using powered conveyors? (7)

(OR)

B) Explain inspection, load testing and control for hoist.

24. A) what are the factors to be considered while selection of wire rope slings.

(OR)

B) Explain metal mesh slings and synthetic web slings.

25 A) What are the procedures to be followed when selection of powered industrial trucks.

(OR)

B) i) Explain hoist way and machine room procedure. (7)

ii) Explain the construction, brakes and inspection of escalator. (8)

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42982

Semester VI

Subject title : Safety in construction and textile industries. **(Elective Theory)**

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester: 16Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
Safety in construction and textile industries	**5**	**80**	**25**	**100***	**100**	**3 Hrs**

***Examination will be conducted for 100 marks and it will be reduced to 75 marks**

Topics and Allocation of Hours

unit	Topics	Hrs
I	Accidents Causes and Management Systems in Construction Industry	15
II	Hazards of Construction and Prevention	15
III	Textile Industry	15
IV	Textile Hazards	15
V	Safety Status	13
	Test and Model Exam	07
	Total	80

RATIONALE:

The study of Occupational Health and Safety in construction Industry and Textile industry examines to promote Health and safety to the workers in India. The Hazards and risk involved in the textile industry is high compared with other industries and least importance is given to textile industries.

OBJECTIVES:

- To explain about the accident causes and management systems.
- To describe the hazards in construction Industry and prevention.
- To explain the construction and textile industries.
- To describe the textile hazards and safety rules.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**ACCIDENTS CAUSES AND MANAGEMENT SYSTEMS IN CONSTRUCTION INDUSTRY** Problems impeding safety in construction industry-causes of fatal accidents, types and causes of accidents related to various construction activities- human factors associated with this accident- construction regulations, contractual clauses – Pre contract activities- preconstruction meeting - design aids for safe construction –permits to work –quality assurance in construction - compensation –Recording of accidents and safety measures – Education and training.	15
II	**HAZARDS OF CONSTRUCTION AND PREVENTION** Excavations, basement and wide excavation, trenches, shafts – scaffolding , types, causes of accidents, scaffold- inspection checklist –false work –erection of structural frame work, dismantling – tunneling –blasting, pre blast and post blast inspection –confined spaces –working on contaminated sites – work over water -road works –power plant constructions – construction of high rise buildings.	15

III	**TEXTILE INDUSTRY** Introduction- process flow charts- short staple spinning-, long staple spinning, viscose rayon and synthetic fiber manufacturer, spun and filament yarn fabric manufacture, jute spinning and jute fabric manufacture- guarding of machinery and safety precautions in opening, carding, combing, drawing, flyer frames and ring frames, doubles, rotor spinning, winding, warping, softening/ spinning specific to jute.	15
IV	**TEXTILE HAZARDS** Accident hazards i) sizing processes- cooking vessels, transports of size, hazards due to steam ii)loom shed – shuttle looms and shuttles looms iii) knitting machines iv) non-woven's. Textile hazards Scouring, bleaching, dyeing, punting, mechanical finishing operations and effluents in textile processes. health and welfare hazards in textile industry related to dust fly and noise generated-control measures-relevant occupational diseases- personal protective equipment-health and welfare measures in textile industry, special precautions for specific hazardous work environments.	15
V	**SAFETY STATUS** Relevant provision of factories act and rules and other statues applicable to textile industry – effluent treatment and waste disposal in textile industry	13

Reference Books:

1. B Hudson, R.,"Construction hazard and Safety Hand book, Butter Worth's, 1985.
2. JnatheaD.Sime, "Safety in the Build Environment", London, 1988.
3. V.J.Davies and K.Thomasin "Construction Safety Hand Book" Thomas elford Ltd., London, 1990.
4. "Safety in textile industry" Thane Belapur Industries Association, Mumbai.1. 100 textile fires – analysis, findings and recommendations LPA
5. Groover and henry ds, "hand book of textile testing and quality control"

Board Examination Question Paper Pattern

Time: 3 Hrs

Max.Marks: 100

PART -A Five question will be asked covering all units. All questions are to be answered. Each question carries 1 mark.

PART-B Fifteen questions will be asked covering all the units. Three question from each unit. Answer any ten questions. Each question carries 2marks.

PART-C Five questions will be asked either or type. One question from every unit. Answer either A or B. Each question carries 15 marks. A and B have subdivisions (7+8).

The questions are to be numbered from 1 to 25. All the units are to be covered with equal weight age.

PART A Definitions and statements Question Number 1 to 5	5x1=5 Marks
PART B Short answer questions Question Number 6 to 20	10x2=20 Marks
PART C Descriptive answer type questions (Either A or B) Question Number 21 to 25	5x15=75 Marks
TOTAL	100 Marks

Note: Board Examinations will be Conducted for 100 Marks and converted to 75 Marks.

MODEL QUESTION PAPER

42982-SAFETY IN CONSTRUCTION &TEXTILE INDUSTRY

TIME: 3 Hrs. **MAX MARKS:** 100

PART-A

5 x 1 = 5

Answer all Questions. Each Question carries one Mark.

1. What are the types of accidents?
2. Define tunneling.
3. What are the safety precautions in textile industry?
4. What is meant by bleaching?
5. What are the methods of waste disposal in textile industry?

PART-B

10 x 2 = 20

Answer any TEN Questions. Each Questions Carries two Marks.

6. What are the causes of accidents?
7. Define quality assurance.
8. Write short notes on safety measures.
9. What is meant by blasting?
10. What are the differences between pre blast and post blast inspection?
11. Define scaffolding.
12. Define winding.
13. What are the two types of frames?
14. Define rotor spinning.
15. What is meant by dyeing?
16. Write short notes on loom shed.
17. What are the special precautions for specific hazardous work environments?
18. What are the rules of safety in textile industry?
19. What is effluent treatment?
20. List out the waste in textile industry?

PART-C

5 x 15 = 75

Answer all questions.

21. A) What are the causes of accident? Explain briefly.

(OR)

B) Explain briefly avoid the accidents in training and education.

22. A) Briefly explain blast inspection.

(OR)

B) Explain the construction if high rise buildings.

23. A) Explain briefly viscose rayon and synthetic fiber manufacturer.

(OR)

B) Explain spun and filament yarn fabric manufacture.

24. A) Briefly explain the knitting machines.

(OR)

B) Explain the health and welfare measures in textile industries.

25. A) Explain the provisions of factories act.

(OR)

B) Explain the methods of waste disposal in textile industry.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42983

Semester VI

Subject title : Transport and Mine Safety **(Elective Theory)**

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester: 16Weeks

Subject	Instruction		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Transport And Mine Safety	**5**	**80**	**25**	**100***	**100**	**3 Hrs**

***Examination will be conducted for 100 marks and it will be reduced to 75 marks**

Topics and Allocation of Hours

unit	Topics	Hrs
I	Transportation safety – road safety	15
II	Specific hazard control measure – fork lift hazard control	15
III	Opencast mines	15
IV	Tunneling	15
V	Risk assessment	13
	Test and Model Exam	07
	Total	80

RATIONALE:

While the fundamental principle of mine safety is to remove health and safety risks to mine workers, mining safety practice may also focus on the reduction of risks to plant (machinery) together with the structure and ore body of the mine.

OBJECTIVES:

- To explain about the transportation safety and road safety.
- To describe about the hazards and control.
- To explain the technique opencast mines, tunneling, risk assessment.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**TRANSPORTATION SAFETY – ROAD SAFETY** Introduction – factors for improving safety on roads – causes of accidents due to drivers and pedestrians-design, selection, operation and maintenance of motor trucks-preventive maintenance- check lists-motor vehicles act – motor vehicle insurance and surveys. Road alignment and gradient-reconnaissance-ruling gradient- maximum rise per k.m.- factors influencing alignment like tractive resistance, tractive force, direct alignment, vertical curves- breaking characteristics of vehicle-skidding-restriction of speeds- significance of speeds-Pavement conditions – Sight distance – Safety at intersections – Traffic control lines and guide posts- guard rails and barriers-street lighting and illumination overloading-concentration of driver. Plant railway: Clearance- track-warning methods-loading and unloading-moving cars-safety practices.	15
II	**TRANSPORTATION OF HAZARDOUS GOODS** Transport emergency card (TREM) – driver training-parking of tankers on the highways-speed of the vehicle – warning symbols – Design of the tanker lorries -static electricity-responsibilities of driver – inspection and maintenance of vehicles-check list-loading and decanting procedures – communication.	15

III	**OPENCAST MINES** Causes and prevention of accident from: heavy machinery, belt and bucket conveyors, drilling, hand tools-pneumatic systems, pumping, water, dust, electrical systems, fire prevention. garage safety – accident reporting system-working condition-safe transportation – handling of explosives. fall of roof and sides-effect of gases-fire and explosions-water flooding- warning sensors-gas detectors- occupational hazards-working conditions-winding and transportation.	15
IV	**TUNNELING** Hazards from- ground collapse, inundation and collapse of tunnel face, falls from platforms and danger from falling bodies. atmospheric pollution (gases and dusts) – trapping –transport-noise electrical hazards-noise and vibration from: pneumatic tools and other machines – ventilation and lighting – personal protective equipment.	15
V	**RISK ASSESSMENT** Basic concepts of risk-reliability and hazard potential-elements of risk assessment – statistical methods – control charts-appraisal of advanced techniques- fault tree analysis-failure mode and effect analysis – quantitative structure-activity relationship analysis-fuzzy model for risk assessment. accident analysis and management-accidents classification and analysis-fatal, serious, minor and reportable accidents – safety audits recent development of safety engineering approaches for mines-frequency rates-accident occurrence investigation-measures for improving safety in mines-cost of accident-emergency preparedness –disaster management	13

Reference Books:

1. Practical guide book on safety health & environment – national safety council – volume 1 – 2013
2. Industrial safety management – lm. Deshmukh – Tata Mc Graw Hill – 2006
3. Safety health & working conditions - ilo training manual – Geneva – Joint Industrial Safety Council – Stockholm - 1994.

Board Examination Question Paper Pattern

Time: 3 Hrs

Max.Marks: 100

PART -A Five question will be asked covering all units. All questions are to be answered. Each question carries 1 mark.

PART-B Fifteen questions will be asked covering all the units. Three question from each unit. Answer any ten questions. Each question carries 2marks.

PART-C Five questions will be asked either or type. One question from every unit. Answer either A or B. Each question carries 15 marks. A and B have subdivisions (7+8).

The questions are to be numbered from 1 to 25. All the units are to be covered with equal weight age.

PART A Definitions and statements Question Number 1 to 5	5x1=5 Marks
PART B Short answer questions Question Number 6 to 20	10x2=20 Marks
PART C Descriptive answer type questions (Either A or B) Question Number 21 to 25	5x15=75 Marks
TOTAL	100 Marks

Note: Board Examinations will be Conducted for 100 Marks and converted to 75 Marks.

MODEL QUESTION PAPER

42983-TRANSPORT AND MINE SAFETY

TIME: 3 Hrs. **MAX MARKS:** 100

PART-A

Answer all Questions. Each Question Carries One Mark. 5x1=5

1. What is a ROAD safety?
2. What is mean TREM?
3. What is a safe transportation?
4. What is a atmospheric pollution?
5. What is a statistical method?

PART B

Answer any ten questions. Each Question carries two Marks. 10x2=20

6. What are the factors involving for improving safety on roads?
7. What are the causes of accidents?
8. Define the term skidding.
9. Draw an any two types of warning symbol.
10. Define the term static electricity.
11. Define the term communication.
12. What are the Causes of accident?
13. What is the prevention of accident?
14. What are the uses of warning sensors?
15. Define the term trapping.
16. What is the importance's of ventilation?
17. What is the importance's of lighting?
18. What are the Basic concepts of risk?
19. What are the different types of cost of accident?
20. Define disaster management.

PART-C

Answer all Questions. **5x15=75**

21. A) i) Enumerate the factors for improving safety on roads. (8)

ii) Explain motor vehicle insurance and surveys. (7)

(OR)

B) i) Explain different types of warning methods (8)

ii) Explain in detail about Road alignment and gradient **(**7)

22. A) i) Explain in detail about Transport emergency card. (7)

ii) Briefly explain the various steps to design of the tanker Lorries. (8)

(OR)

B) i) Explain important uses of inspection and maintenance of vehicles.(8)

ii) Explain loading and decanting procedures. (7)

23. A) i) Explain Causes and prevention of accident from heavy machinery (7)

ii) Explain Causes and prevention of accident from belt and bucket conveyors. (8)

(OR)

B) i) Explain functions of accident reporting system. (7)

ii) Explain in detail about occupational hazards. (8)

24. A) i) Briefly explain atmospheric pollution. (7)

ii) Explain in detail about how to control noise electrical hazards. (8)

(OR)

B) i) Explain in detail about how to control noise and vibration from pneumatic tools. (7)

ii) Explain any two personal protective equipment. (8)

25. A) i) Explain elements of risk assessment. (8)

ii) Explain fault tree analysis. (7)

(OR)

B) i) Explain how you will analyze fuzzy model for risk assessment. (7)

ii) Explain how you measures for improving safety in mines will. (8)

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42963

Semester : VI

Subject Title : Safety and regulations Audit Practical

TEACHING AND SCHEME OF EXAMINATIONS

No. of Weeks per Semester: 16 Weeks

Subject	Instruction		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Safety and regulations Audit Practical	4	64	25	100*	100	3Hrs

***Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

Objectives

- Study of safety audit of a workplace
- Preparation of Audit for the compliance of factories Act and TN factories Rules
- Preparation of Audit for the compliance of Indian Electricity rules.
- Identification of Prevention and Control of Pollution of environment and workmen compensation.
- Preparation of Environmental management system and occupational health and safety management system.

List of Experiments:

1. Safety audit of a workplace.
2. Audit for the compliance of factories Act.1948 and TN factories Rules.1950
3. Audit for the compliance of Indian Electricity rules,1956 and Electricity Act 2003.
4. Audit for the compliance of Air (Prevention and Control of Pollution) Act1981.
5. Audit for the compliance of water (Prevention and Control of Pollution) Act1974.
6. Audit for the compliance of Environment protection Act 1986.
7. Audit for the compliance of workmen compensation Act 1923.
8. Audit for the compliance of ISO 14001-2015 Environmental management system.
9. Audit for the compliance of ISO 45001-2008 occupational health and safety management systems.
10. Study of Occupational safety, Health and working conditions code-2020.

LIST of EQUIPMENTS / DATA (for a batch of 30 Students)

- Safety audit forms
- Forms developed for the audit and relevant act rules/ standard
- Relevant code.

BOARD EXAMINATION

DETAILED ALLOCATION OF MARKS

Internal Mark

Note: All the students should maintain the observation note book/ manual as per the regulation..

Observation - 10 Marks
Record work - 10 Marks
Attendance -05 Marks
Total -25 Marks

Board Examination

Note: All the exercises have to be completed. All the exercises should be given in the question paper and students are allowed to select by a lot.
Record note book should be submitting during examination

ALLOCATION OF MARKS

Aim/Procedure/Material preparation/ Arrangements	-	30
Demonstration/ Flow chart/Data analysis	-	35
Result and discussion	-	25
Viva-Voce	-	10
Total marks	**-**	**100**

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42984

Semester : VI

Subject Title : Construction and Material handling Practical **(Elective)**

TEACHING AND SCHEME OF EXAMINATIONS

No. of Weeks per Semester: 16 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Construction and Material handling Practical	4	64	25	100*	100	3Hrs

***Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

Objectives

- Preparation of work permit environment
- Preparation of inspection report sheet
- Identify the risk assessment for confined space work in construction environment
- Identify the risk assessment for manual handling
- Identify the good lifting technique for material handling
- Prepare inspection for material handling equipment

List of Experiments:

1. Prepare work permits for (a) Confined space work and (b) hot work in construction environment.
2. Develop inspection report for scaffolds.
3. Develop inspection report for excavation work
4. Perform risk assessment for confined space work in construction environment.
5. Perform risk assessment for excavation work in construction environment.
6. Demonstrate the NEBOSH recommended weights for manual lifting for the given loads and persons.
7. Perform risk assessment for manual handling.
8. Demonstrate the good lifting technique for material handling.
9. Perform inspection for material handling equipment.
10. Perform inspection for material handling lifting accessories.

LIST OF EQUIPMENTS / DATA (for a batch of 30 Students)

- Industry/ site visit, model forms/ report
- Industry/ site visit, Risk Assessment forms
- NEBOSH recommended weights, volunteers
- Risk Assessment form
- Weight for manual handling volunteers
- Inspection forms
- Multiplier chart for NIOSH Lifting equation.

BOARD EXAMINATION

DETAILED ALLOCATION OF MARKS

Internal Mark

Note: All the students should maintain the observation note book/ manual as per the regulation..

Observation - 10 Marks
Record work - 10 Marks
Attendance -05 Marks
Total -25 Marks

Board Examination

Note: All the exercises have to be completed. All the exercises should be given in the question paper and students are allowed to select by a lot.
Record note book should be submitting during examination

ALLOCATION OF MARKS

Aim/Procedure/Material preparation/ Arrangements	-	30
Demonstration/ Flow chart/Data analysis	-	35
Result and discussion	-	25
Viva-Voce	-	10
Total marks	**-**	**100**

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42985

Semester : VI

Subject Title : Transport and Road Safety Practical **(Elective)**

TEACHING AND SCHEME OF EXAMINATIONS

No. of Weeks per Semester: 16 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Transport and Road Safety	4	64	25	100*	100	3Hrs

***Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

Objectives

- Preparation of loading and unloading of truck
- Preparation of internal roadways in a plant
- Identify the hazards operation
- Preparation of transport vehicle permits and driver qualification
- Identify the good lifting technique for material handling

List of Experiments:

1. Study of safe loading and unloading of truck carrying chemicals.
2. Demonstration of safe design of internal roadways in a facility / plant
3. Identification of hazards in crane operations.
4. Identification of Hazards in fork lift operations.
5. Audit for Compliance of vehicle permits for transporting various products.
6. Audit for compliance of driver qualifications for driving transport vehicles.
7. Identification of symbols used in vehicles transporting hazardous products.
8. Study of traffic and road safety signs in India.
9. Exercise on placing suitable road safety sign boards in a facility / plant.
10. Demonstration of signs used while operating material handling equipment.

LIST OF EQUIPMENTS (for a batch of 30 Students)

- Standard operating procedures
- Design of internal roadways
- Forms relevant for hazard identification and recording, Appropriate Industrial visits, visual media
- Forms developed for the audit and relevant act/ rules / standard
- Transport hazard pictograms
- Road safety signs
- Road safety signs, plant / facility map
- Standard operating procedures
- Traffic signs and symbols board
- India Map showing National highways
- TREM Card
- Emergency Information Panel

BOARD EXAMINATION

DETAILED ALLOCATION OF MARKS

Internal Mark

Note: All the students should maintain the observation note book/ manual as per the regulation..

Observation - 10 Marks
Record work - 10 Marks
Attendance -05 Marks
Total -25 Marks

Board Examination

Note: All the exercises have to be completed. All the exercises should be given in the question paper and students are allowed to select by a lot.
Record note book should be submitting during examination

ALLOCATION OF MARKS

Aim/Procedure/Material preparation/ Arrangements	-	30
Demonstration/ Flow chart/Data analysis	-	35
Result and discussion	-	25
Viva-Voce	-	10
Total marks	**-**	**100**

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42986

Semester : VI

Subject Title : Emergency Preparedness Practical **(Elective)**

TEACHING AND SCHEME OF EXAMINATIONS

No. of Weeks per Semester: 16 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Emergency Preparedness Practical	4	64	25	100*	100	3Hrs

***Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

Objectives

- Identify the work process of the awareness & preparedness for emergencies at local level
- Preparation of awareness & preparedness for emergencies at local level
- Exposure to the knowledge of hazardous installations and local community
- Preparation of time table for implementing the awareness & preparedness for emergencies at local level (apell) process

List of Experiments:

1. Study of an On-site emergency plan.
2. Study of an off-site Emergency plan.
3. Reading and demonstration of excavation plan of a chemical plant / facility.
4. Mock drill of Assembling at the emergency assembling point.
5. Developing flowcharts for various possible emergency situations.
6. Demonstration of emergency preparedness in a chemical plant / facility.
7. Demonstration of emergency preparedness in the event of a fire.
8. Demonstration on notifying the Government departments during an emergency.
9. Demonstration on warning the public during an emergency.
10. Demonstration on the preparedness for any disaster based on local geography.
11. Addressing the issues in emergency preparedness planning.

LIST OF EQUIPMENTS (for a batch of 30 Students)

- Sample on-site emergency plan
- Sample off-site emergency plan
- Sample excavation plan
- Mock drill procedures
- Engineering Drawing equipments and instruments
- Emergency plan
- Disaster Management plan
- Emergency vehicles
- Communicative equipments
- Emergency tools kit
- Cut section of fire extinguishers
- Personal protective equipments (as per hazards involved)
- All emergency phone numbers on display

BOARD EXAMINATION

DETAILED ALLOCATION OF MARKS

Internal Mark

Note: All the students should maintain the observation note book/ manual as per the regulation..

Observation - 10 Marks
Record work - 10 Marks
Attendance -05 Marks
Total -25 Marks

Board Examination

Note: All the exercises have to be completed. All the exercises should be given in the question paper and students are allowed to select by a lot.
Record note book should be submitting during examination

ALLOCATION OF MARKS

Aim/Procedure/Material preparation/ Arrangements	-	30
Demonstration/ Flow chart/Data analysis	-	35
Result and discussion	-	25
Viva-Voce	-	10
Total marks	**-**	**100**

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING/TECHNOLOGY SYLLABUS

N – SCHEME

(Implemented from the Academic year 2021-2022 onwards)

Course Name : DIPLOMA IN FIRE TECHNOLOGY AND SAFETY

Course Code : 1122

Subject Code : 42964

Semester : VI

Subject Title : Project Work and Internship

TEACHING AND SCHEME OF EXAMINATIONS

No. of Weeks per Semester: 16 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
Project Work and Internship	4	64	25	100*	100	3Hrs

***Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

RATIONALE:

These subject ‘Project Work and Internship” is the continuation of the previous semester subjects. The students are to implement the detailed project plan, which they have prepared. These projects are generally an integration of the various types of skills acquired during their course of study. Hence it is essential that students are given opportunity to develop and integrate the highly essential industry oriented competencies and skills. This subject builds up greater confidence to face in the world of work.

OBJECTIVES:

- Implement the theoretical and practical knowledge gained through the curriculum into an application suitable for a real practical working environment preferably in an industrial environment.
- Implement the planned activity as a team.
- Take appropriate decisions on collected information.
- Carry out cooperative learning through synchronous guided discussions within the class in key dates, asynchronous document sharing and discussions, as well as to

prepare collaborative edition of the final project report.

Project Work and Internship:

The students of all the Diploma Courses have to do a Project Work as part of the Curriculum and in partial fulfillment for the award of Diploma by the State Board of Technical Education and Training, Tamil Nadu. In order to encourage students to do worthwhile and innovative projects, every year prizes are awarded for the best three projects i.e. institution wise, region wise and state wise. **The Project work must be reviewed twice in the same semester. The project work is approved during the V semester by the properly constituted committee with guidelines.**

INTERNAL ASSESSMENT:

The internal assessment should be calculated based on the review of the progress of the work done by the student periodically as follows.

Detail of assessment	Period of assessment	Max. Marks
First Review	6th week	10
Second Review	12th week	10
Attendance	Entire semester	5
Total		25

EVALUATION FOR BOARD EXAMINATION:

Details of Mark allocation	Max Marks
Demonstration/Presentation	25
Report	25
Viva Voce	30
Internship report	20
Total	100

*Examination will be conducted for 100 marks and will be converted to 75 marks.

Proper record should be maintained for the two Project Reviews and preserved for one semester after the publication of Board Exams results. It should be produced to the flying squad and the inspection team at the time of inspection/verification.

a) Internship Report:

The internship training for a period of two weeks shall be undergone by every candidate at the end of IV / V semester during vacation. The certificate shall be produced along with the internship report for evaluation. The evaluation of internship training shall be done along with final year “Project Work & Internship” for 20 marks. The internship shall be undertaken in any industry / Government or Private certified agencies which are in social sector / Govt. Skill Centre’s / Institutions / Schemes.

A neatly prepared PROJECT REPORT as per the format has to be submitted by individual student during the Project Work & Internship Board examination.