

ALAGAPPA UNIVERSITY

(Accredited with A+ Grade by NAAC (CGPA: 3.64) in the Third Cycle), Graded as
Category-I University and granted autonomy by MHRD-UGC)

DIRECTORATE OF COLLABORATIVE PROGRAMMES



Diploma in Rail Safety

Regulations and Syllabus

[For those who join the Course in July 2023 and after]

CHOICE BASED CREDIT SYSTEM

GENERAL INSTRUCTIONS AND REGULATIONS

Diploma in Rail safety conducted by Alagappa University, Karaikudi, and Tamil Nadu through its Collaborative Institution. Applicable to all the candidates admitted from the academic year **2023** onwards.

1. Eligibility:

Candidate for admission to **Diploma in Rail safety** shall be required to have passed in any bachelor degree from recognized University/Institution.

Pattern: Semester

2. Admission:

Admission based on the marks in the qualifying examination.

3. Duration of the course:

The course for the Full-Time students shall extend over a period of only one Academic Year.

4. Standard of Passing and Award of Division:

- Students shall have a minimum of 50% of total marks of the University examinations in each subject. The overall passing minimum is 50% both in aggregate of Continuous Internal Assessment and external in each subject.
- The minimum marks for passing in each theory / Lab course shall be 50% of the mark prescribed for the paper / lab.
- A candidate who secures 50% or more marks but less than 60% of the aggregate marks, shall be awarded **SECONDCLASS**.
- A candidate, who secures 60% or more of the aggregate marks, shall be awarded **FIRSTCLASS**.
- The Practical/Project shall be assessed by the two examiners, by an internal examiner and an external examiner.

5. Continuous internal Assessment:

- a. Continuous Internal Assessment for each paper shall be by means of Written Tests, Assignments, Class test and Seminars
- b. **25 marks** allotted for the Continuous Internal assessment is distributed for Written Test, Assignment, Class test and Seminars.
- c. Two Internal Tests of 2 hours duration may be conducted during the semester for each course / subject and the best marks may be considered and one Model Examination will be conducted at the end of the semester prior to University examination. Students may be asked to submit at least five assignments in each subject. They should also participate in Seminars conducted for each subject and mark allocated accordingly.
- d. Conduct of the continuous internal assessment shall be the responsibility of the concerned faculty.
- e. The continuous internal assessment marks are to be submitted to the University at the end of every year.
- f. The valued answer papers/assignments should be given to the students after the valuation is over and they should be asked to check up and satisfy themselves about the marks they have scored.
- g. All mark lists and other records connected with the continuous Internal Assessments should be in the safe custody of the institution for at least one year after the assessment.

6. Attendance:

- Students must have earned 75% of attendance in each course for appearing for the examination.
- Students who have earned 74% to 70% of attendance to be applied for condonation in the prescribed form with the prescribed fee.
- Students who have earned 69% to 60% of attendance to be applied for condonation in the prescribed form with the prescribed fee along with the medical certificate.
- Students who have below 60% of attendance are not eligible to appear for the examination. They shall re-do the semester(s) after completion of the programme.

7. Examination:

The University examinations will be held at the end of the Academic Year for duration of three hours for each subject.

8. Miscellaneous

- a. Each student possesses the prescribed textbooks for the subject and the workshop tools as required for theory and practical classes.
- b. Each student is issued with an identity card by the University to identify his/her admission to the course
- c. Students are provided library and internet facilities for development of their studies.
- d. Students are to maintain the record of practicals conducted in the respective laboratory in a separate Practical Record Book and the same will have to be presented for review by the University examiner.
- e. Students who successfully complete the course within the stipulated period will be awarded the degree by the University.

9. Fee structure

Course fee shall be as prescribed by the University and 50% of the course fee should be disbursed to University. Special fees and other fees shall be as prescribed by the Institution and the fees structure must be intimated to the University. Course fees should be only by Demand draft / NEFT and AU has right to revise the fees accordingly.

Pattern	Course Fee payment deadline
Semester	Fee must be paid before 10 th February of the academic year

10. Other Regulations:

Besides the above, the common regulation of the University shall also be applicable to this programme

Course Structure
DIPLOMA IN RAIL SAFETY

	Course Code	Title of the Paper	T/P	Cr.	Hrs./ Week	Max. Marks		
						Int.	Ext.	Total
Sem I	84111	History & Evolution of Indian Railways	T	4	5	25	75	100
	84112	Construction Safety in Railways	T	4	5	25	75	100
	84113	Electrical and Chemical Safety	T	5	10	25	75	100
	84114	Fire Fighting & ERP Practical	P	5	10	25	75	100
	Total				18	30	130	270
Sem II	84121	Heavy Material Handling- Methods&Systems	T	4	5	25	75	100
	84122	Fire Safety	T	4	5	25	75	100
	84123	Standard on Rail Safety	T	5	10	25	75	100
	84124A 84124B	Internship/ Project	I/ PR	5	10	25	75	100
	Total				18	30	130	270

PROGRAM OUTCOMES(POs)-Diploma in Rail Safety	
After the successful completion of Rail Safety program ,students are expected to	
PO 1	Acquire fundamental knowledge and skills on the fire and Industrial safety
PO 2	Gain advanced level knowledge ,techniques ,skills and modern tools in the field of fire and Industrial Safety
PO 3	Understand the legal aspects and procedures of Safety Inspections and Safety Legislation
PO 4	Develop and Evaluate health and safety program for a variety of industries to promote the health and safety of workers
PO 5	Gain information on operation of fire service equipments and practical firefighting
PO 6	Acquire skills in the field of Energy Audit, Green Audit, OSHA standards, NEBOSH, etc to improve employment opportunities
PO 7	Aware of the impact of the professional safety solutions in societal a environmental contexts, and demonstrate the knowledge of and need for sustainable development
PO 8	Function effectively as an individual and as member or leader in diverse teams, and in multidisciplinary settings
PO 9	An ability to assess safety and legal issues and the consequent responsibilities relevant to The professional
PO 10	Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadcast context of technological change

Program Education Objective-Diploma Rail Safety Program

1. Apply principles of transformational leadership to negotiate, mentor, motivate, and lead others toward a shared and ethical organizational vision or goal.
2. Apply knowledge of leadership, change, business models, organizational issues, and regulations to ensure organizational effectiveness, resulting in the improvement of emergency services.
3. Utilize the methods and resources of research, science, and technology to effectively manage emergency services.
4. Utilize appropriate communication strategies and methods to accomplish organizational goals and objectives.
5. Utilize appropriate assessment and planning skills to improve organization and community risk management for emergency services.

Program Specific Objective-Diploma Rail Safety Program

1. Apply the knowledge and basic sciences, and Safety, Fire Engineering to the solution of complex engineering problems
2. Identify, formulate, study research literature, and analyze complex Safety and Fire Engineering problems reaching substantiated conclusions
3. Design solutions for complex engineering problems and design Safety and Fire components that meet the specified needs.
4. Use Fire engineering research-based knowledge related to interpretation of data and provides valid conclusions.
5. Create, select, and apply modern Safety and Fire Engineering and IT tools to complex engineering activities with an understanding of the limitations.

Programme Specific Outcomes-Diploma in Rail Safety	
After the successful completion of the Rail Safety Programme ,the students are expected to	
PSO 1	Students are able to design solution for complex major hazardous industries in terms of fixed firefighting installation and fire prevention that meet the specified needs
PSO 2	Students infer the concepts impact of safety engineering solutions related to the fire prevention, industrial risk assessment and accident prevention in environmental economic and societal context
PSO 3	Students gain relevant knowledge, skills, provisions and rules related to Pollution controlIn important legislations
PSO 4	Familiarize various firefighting strategies in case of BLEVE ,LPG hazards and spillage
PSO 5	Students are familiar with Assess hazards and risk in process and manufacturing industries and devisere medial measures and safety management systems

DIP(Rail Safety) I St Semester					
CORE	Course Code 84111	History & Evolution of Indian Rail ways	T	Credits:4	Hours :5
Pre-requisite			Syllabus Revised		2023- 2024
Course Objectives	1. To familiarize the basic information about History of Indian Railways. 2. To educate on Evolution of Indian Railways 3. To learn about Infrastructure of Indian Railways 4. To provide knowledge about Manufacturing Capacity of Indian Railways 5. To learn about Major Rail Accidents in India.				
UNIT - I	HISTORY OF INDIAN RAILWAYS Introduction - History Of Indian Railways - Bombay To Thane Service- Inaugural To Victoria Terminus –Howrah station-Gipr motor coach- Train in bhoreghats- Vyasarpaady to arcot-Allahabad to kanpur- Narrow gauge-Meter Gauge - Broad Gauge - Electrified Locomotives-Coaching Vehicles - Freight Wagons-Stations - Yards-Good sheds- Repair Shops-Workforce				
UNIT - II	EVOLUTION OF INDIAN RAILWAYS Launch of passenger rail services famine & Economic growth moves to wards centralization electrification & Hard Times - Partition & Zonal Creation - Technology & Phasing Out Steam-Moving Online - Future of Indian railways				
UNIT - III	INFRASTRUCTURE OF INDIAN RAILWAYS Manufacturing - Network - Services - Urban Rail Private Railways - Unesco World Heritage Sites-Station categories-Travel Classes-Train Types-Tourism - Ticketing				
UNIT - IV	MANUFACTURING CAPACITY OF INDIAN RAILWAYS Integral coach factory – Rail coach factory- Modern coach factory-Different categories & Types of Coaches In Indian Railways-Different Classes of Travel In Indian rails				
UNIT - V	MAJOR RAIL ACCIDENTS IN INDIA Bihar Train Disaster Firozabad Rail Disaster Collision Of Awadh-Assam Express And Brahmaputra Mail Khanna Rail disaster - Gyaneshwari Express Train Derailment - Pamban- Dhanuskodi Passenger Train - Howrah-New Delhi rajdhani express				
References					
1. Udai Pareek, Understanding Organisational Behaviour, 2 Edition, Oxford Higher Education, 2004. 2. Sanoy Banerjee, "Industrial hazards and plant safety", Taylor & Francis, London, 2003. 3. McShane & Von Glinov, Organisational Behaviour, 4 Edition, Tata Mc Graw Hill, 2007.					
Related online content (MOOC, Swayam, NPTEL, Website etc.)					
https://nptel.ac.in/courses/109103171					
https://nptel.ac.in/courses/105107123					
Course Outcomes					Knowledge level
CO-1	To the basic concepts of History of Indian Rail ways				K1
CO-2	To summarize the knowledge about Evolution of Indian Rail ways.				K2
CO-3	To Discuss the Infrastructure of Indian Rail ways				K4
CO-4	To compare the different Rail coach Factories				K5
CO-5	To Elaborate the Major Rail Accident				K6

On what level it correlated with COs & POs -based on that we have to give marks
Mapping Course Outcome Vs Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2(M)	1(L)	1(L)	2(M)	1(L)	2(M)	2(M)	1(L)	1(L)	1(L)
CO2	2(M)	1(L)	2(M)	1(L)	1(L)	2(M)	1(L)	2(M)	1(L)	2(M)
CO3	1(L)	1(L)	1(L)	2(M)	2(M)	1(L)	2(M)	1(L)	2(M)	1(L)
CO4	2(M)	2(M)	2(M)	1(L)	1(L)	1(L)	1(L)	1(L)	2(M)	2(M)
CO5	2(M)	1(L)	1(L)	2(M)	1(L)	2(M)	1(L)	2(M)	1(L)	1(L)
W.AV	1.8	1.2	1.4	1.6	1.2	1.6	1.4	1.4	1.4	1.4

S –Strong (3), M-Medium (2), L- Low (1)

Mapping Course Outcome Vs Programme Specific outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2(M)	1(L)	2(M)	1(L)	1(L)
CO2	1(L)	2(M)	1(L)	2(M)	1(L)
CO3	2(M)	2(M)	1(L)	1(L)	1(L)
CO4	1(L)	1(L)	1(L)	2(M)	2(M)
CO5	2(M)	1(L)	2(M)	1(L)	1(L)
W.AV	1.6	1.4	1.4	1.4	1.2

S –Strong (3), M-Medium (2), L- Low (1)

DIP(Rail safety)					
I - Semester					
Core	Course Code 84112	Construction safety in Railways	T	Credits:4	Hours:5
Pre-requisite	Basic Knowledge of Construction safety		Syllabus Revised	2023-2024	
Course Objectives	1. To know causes of accidents related to construction activities and human factors associated with these accident 2. To understand the construction regulations and quality assurance in construction 3. To have the knowledge in hazards of construction and their prevention methods 4. To know the working principles of various construction machinery 5. To gain knowledge in health hazards and safety in demolition work				
UNIT- I	ACCIDENTS CAUSES AND MANAGEMENT SYSTEMS Problems Impeding Safety In Construction Industry- Causes Of Fatal Accidents, Types And Causes Of Accidents Related To various Construction Activities, Human Factors Associated With These Accident –Construction Regulations, Contractual clauses – Pre Contract Activates, Preconstruction Meeting -Design Aids For Safe Construction – Permits To Work –Quality assurance In Construction -Compensation– Education And Training				
UNIT - 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 in section – Confined spaces–Working on contaminated sites– Work over water-Road works–Power plant Constructions – Construction Of High Rise Buildings.				
UNIT- III	WORKING AT HEIGHTS Fall Protection In Construction Osha 3146 – Osha Requirement For Working At Heights, Safe Access And Egress –Safe Use Of Ladders- Scaffolding , Requirement For Safe Work Platforms, Stairways, Gangways And Ramps – Fall prevention And Fall Protection , Safety Belts, Safety Nets, Fall Arrestors, Controlled Access Zones, Safety Monitoring systems– Working on Fragile roofs, Work permit Systems, Height Pass– Accident case Studies.				
UNIT- IV	CONSTRUCTION MACHINERY Selection, Operation, Inspection and testing of hoisting cranes, Mobile cranes, Tower cranes, Crane inspection checklist - Builder's Hoist, Winches, Chain Pulley Blocks –Use Of Conveyors – Concrete Mixers, Concrete Vibrators –Safety In Earth Moving Equipment, Excavators, Dozers, Loaders, Dumpers, Motor Grader, Concrete Pumps, Welding machines, Use of portable electrical tools, Drills, Grinding tools, Manual handling of scaffolding, Hoisting cranes–Use of conveyors And Mobile Cranes – Manual Handling.				
UNIT- V	SAFETY IN DEMOLITION WORK Safety In Demolition Work, Manual, Mechanical, Using Explosive - Keys To Safe Demolition, Pre Survey Inspection, Method Statement, Site Supervision, Safe Clearance Zone, Health Hazards From Demolition- Indian Standard - Trusses, Girders And Beams – First Aid – Fire Hazards And Preventing Methods – Interesting Experiences At The Construction Site against the fire Accidents				

References		
1. Handbook of OSHA Construction safety and health Charles D.Reeseand JamesV.Edison		
2. Hudson, R.,” Construction hazard and Safety Hand book, Butter Worth’s,1985.		
3. Jnathed.Sime, “Safety in the Build Environment”,London,1988.		
4. V.J.DaviesandK.Thomasin“ConstructionSafetyHandBook”ThomasTelfordLtd.,London,1990		
Related online content (MOOC, Swayam, NPTEL,Websiteetc.)		
https://onlinecourses.nptel.ac.in/noc21_ce16/preview		
https://archive.nptel.ac.in/courses/105/102/105102206/		
Course Outcomes		Knowledgelevel
CO-1	To Recall the problems impeding safety in construction industries.	K1
CO-2	To Summaries the types and causes of accidents, and designing aids for safe construction.	K2
CO-3	To Categorise the hazards during construction of power plant, road work sand high rise buildings.	K4
CO-4	To Interpret construction regulations and Indian standards for construction and demolition work.	K5
CO-5	To Elaborate the safety procedure for working at heights during construction.	K6

On what level it correlated with COs & POs -based on that we have to give marks
Mapping Course Outcome Vs Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3(S)	2(M)	3(S)	2(M)	2(M)	3(S)	2(M)	3(S)	2(M)	3(S)
CO2	3(S)	3(S)	2(M)	2(M)	3(S)	3(S)	2(M)	3(S)	2(M)	3(S)
CO3	3(S)	2(M)	3(S)	2(M)	3(S)	3(S)	2(M)	2(M)	3(S)	2(M)
CO4	2(M)	3(S)	2(M)	3(S)	3(S)	2(M)	2(M)	3(S)	2(M)	3(S)
CO5	3(S)	2(M)	3(S)	3(S)	2(M)	3(S)	3(S)	2(M)	3(S)	2(M)
W.AV	2.8	2.4	2.6	2.4	2.6	2.8	2.2	2.6	2.4	2.6

S–Strong(3),M-Medium(2),L-Low(1)

Mapping Course Outcome Vs Programme Specific outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3(S)	2(M)	3(S)	3(S)	2(M)
CO2	2(M)	3(S)	2(M)	3(S)	2(M)
CO3	3(S)	2(M)	3(S)	3(S)	3(S)
CO4	2(M)	3(S)	2(M)	3(S)	2(M)
CO5	3(S)	2(M)	3(S)	2(M)	3(S)
W.AV	2.6	2.4	2.6	2.8	2.4

S–Strong(3),M-Medium(2),L-Low(1)

DIP (Rail Safety) I-Semester					
CORE	Course Code	Electrical and Chemical Safety	T	Credits:5	Hours:10
	84113				
Pre-requisite			Syllabus Revised	2023-2024	
Course Objectives	<ul style="list-style-type: none"> To familiarize the basic information about electricity and hazards. To educate on electrical hazard analysis. To learn about protection from electrical hazards. To provide technical knowledge in chemical exposure and safety. To analyse the handling and storage of hazardous chemicals. 				
UNIT- I	BASICS OF ELECTRICITY & HAZARDS OF ELECTRICITY Introduction-Current-Voltage-Power-Resistance-Capacitor- Inductor - Ohm's Law -Types Of Electrical Faults-Overloads -Short Circuits-Hazard Analysis-Shock-Arc- Blast - Body Parts & Effects Of Shock- Heart, Pulmonary system-Indian electricity rules- Statutory requirements from electrical inspectorate-International standards on electrical safety-Cpr.				
UNIT - II	ELECTRICAL HAZARD ANALYSIS Primary & Secondary Hazards - Shocks - Burns-Scalds Falls - Safety In The Use Of Electricity Energy Leakage -Clearances & Insulation -Classes Of Insulation - Voltage Classifications - Excess Energy - Current Surges – Over current & Short Circuit Current- Heating Effects Of Current - Electromagnetic Forces - Corona Effect – Static electricity Sources - Electrical Causes Of Fire & Explosion Ionization - Spark & Arc - National Electrical Safety Code-Lightning hazards-Lightning arrestor -Earthing				
UNIT- III	MINIMIZING ELECTRICAL HAZARDS Fuses -Circuit Breakers & Overload Relays - Protection Against Over Voltage & Under Voltage-Safe Limits Of amperage -Safe Distance From Lines -Short Circuit Protection- No Load Protection - Earth Fault Protection - Earthing Standards- Grounding - Equipment Grounding - Miniature Circuit Breaker - Earth Leakage Circuit Breaker –Ground fault Circuit interrupter –Electrical guarding- Personal protective Equipment's				
UNIT- IV	EVALUATING HAZARDS & ASSESSING RISKS OF CHEMICALS Introduction- Types Of Chemicals - Routes Of Entry Sources Of Information-Toxicity- Flammable, Reactive & Explosive hazards physical hazards nonmaterial's biohazards- Radio active hazards-Labeling of chemicals-Safety Data Sheet- Globally Harmonized System - Exposure Limits Whmis Symbols -Clp Hazard Pictogram toxicological properties: Lc50&Ld50flammable limits-Atmospheric monitoring – Health surveillance.				
UNIT- V	CLASSIFICATION & MANAGEMENT OF HAZARDOUS CHEMICALS Classification of Hazardous Chemicals Green Chemistry Acquisition Of Chemicals - Inventory & Tracking Of chemicals - Transportation Of Hazardous Chemicals - Emergency Information Panel Hazchem Code – Personal protective Equipment for Chemicals - Chemical Exposure Risk Assessment-Hierarchy Of Risk Controls-General guidelines for safe storage & Handling-Chemical storage tanks design considerations.				

References

1. Electrical Safety Handbook, Hardcover – by John Cadick(Author), Mary Capelli-Schellpfeffer(Author), Dennis Neitzel (Author)
2. Practical Guide to Electrical Safety, Author(s):RKJain

Related online content (MOOC, Swayam, NPTEL, Website etc.)

https://onlinecourses.swayam2.ac.in/nou20_cs08/preview

<https://alison.com/course/chemical-safety-process-safety-managment>

Course outcomes		Knowledge level
CO-1	To define the fundamental concepts of electricity and risks.	CO-1
CO-2	To express the knowledge about analysis of electrical hazards.	CO-2
CO-3	To identify the concepts about electrical protection devices.	CO-3
CO-4	To simplify the hazard and risks of chemicals.	CO-4
CO-5	To evaluate the safe storage and transportation of chemicals.	CO-5

On what level it correlated with COs & POs -based on that we have to give marks Mapping Course Outcome Vs Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3(S)	2(M)	3(S)	2(M)	2(M)	3(S)	2(M)	3(S)	2(M)	3(S)
CO2	3(S)	3(S)	2(M)	2(M)	3(S)	3(S)	2(M)	3(S)	2(M)	3(S)
CO3	3(S)	2(M)	3(S)	2(M)	3(S)	3(S)	2(M)	2(M)	3(S)	2(M)
CO4	2(M)	3(S)	2(M)	3(S)	3(S)	2(M)	2(M)	3(S)	2(M)	3(S)
CO5	3(S)	2(M)	3(S)	3(S)	2(M)	3(S)	3(S)	2(M)	3(S)	2(M)
W.AV	2.8	2.4	2.6	2.4	2.6	2.8	2.2	2.6	2.4	2.6

S–Strong(3),M-Medium(2),L-Low(1)

Mapping Course Outcome Vs Programme Specific outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3(S)	2(M)	3(S)	3(S)	2(M)
CO2	2(M)	3(S)	2(M)	3(S)	2(M)
CO3	3(S)	2(M)	3(S)	3(S)	3(S)
CO4	2(M)	3(S)	2(M)	3(S)	2(M)
CO5	3(S)	2(M)	3(S)	2(M)	3(S)
W.AV	2.6	2.4	2.6	2.8	2.4

S–Strong(3),M-Medium(2),L-Low(1)

Course Code: 84114	FIRE FIGHTING & EMERGENCY RESPONSE PRACTICAL	p	Credits:5	Hours:10
OBJECTIVES				
<ul style="list-style-type: none"> ➤ To Impart the Fire Fighting & Emergency response to the students ➤ To Express the Evacuating procedure and emergency response procedures 				
EXPERIMENTS				
<ol style="list-style-type: none"> 1. Identification of classes of fire. 2. Learning the methods of fire fighting. 3. Identification of appropriate fire extinguishers. 4. Evacuating work force by means of emergency siren/alarm. 5. Steps for emergency planning and preparedness. 6. Emergency response team and their response. 7. Head count procedures. 8. Fire mock drill & rescue operation. 9. Different types of sirens and siren coding. 10. Debriefing and resuming operations. 				
REQUIREMENTS				
<ol style="list-style-type: none"> 1.All type of Fire extinguishers 2.Emergency Services 3.Suitablewaterandsandbuckets 4.Allotherrequiredsafetyequipmentsforfiredemo 5.Provision of Windsock 				
OUTCOMES				
<ol style="list-style-type: none"> 1.Thestudentswillbeableto 2.To Identify the Fire classifications and fire fighting methods. 3.To Practice Fire Rescue and evacuation methods with ERP procedures 4.To Operate fire mock drill with Head count arrangements 5.To classify Sirencodingsandsimplifyresumingoperations. 				
REFERENCE				
<p>GuidebookonFiresafety–NationalSafetyCouncil-2014 Guidebook-Designing for Fire safety-Nationalsafetycouncil- 20153. PracticalGuideonSHE- Volume4-Nationalsafetycouncil-2010</p>				

DIP(Rail Safety)II nd - Semester					
Elective	Course code 84121	Heavy Material Handling- Methods & Systems	T	Credits:4	Hours:5
Pre-requisite		Basic Knowledge of Heavy Material Handling- Methods& Systems	Syllabus Revised		2023-2024
Course Objectives		<ol style="list-style-type: none"> 1. To study the applications of ergonomic principles and physiology of workers 2. To know the concepts of personal protective equipment and its usages 3. To create the knowledge in process and equipment design insafety aspects 4. To Prioritise Concept modules in Equipment design 5. To Justify Job and person all risk factors 			
UNIT- I		WORKSTUDY: Study Of Operations – Work Content – Work Procedure – Breakdown – Human Factors – Safety And method Study – Methods And Movements AtThe Workplace – Substitution With Latest Devices –Robotic concepts–Application inhazardous workplaces– Productivity, Quality and safety(Pqs).			
UNIT - II		ERGONOMICS: Definition – Applications Of Ergonomic Principles In The Shop Floor – Work Benches – Seating arrangements–Layout of electrical panels- Switchgears– Principles of motion economy–Location Of Controls – Display Locations – Machine Foundations – Work Platforms, Fatigue, Physical and mental strain– Incidents of accident–Physiology of workers.			
UNIT- III		PERSONAL PROTECTION Concepts Of Personal Protective Equipment – Types – Selection Of Ppe –Invisible Protective barriers– Procurement, Storage, Inspection and testing–Quality– Standards– Ergonomic considerations in personal protective equipment design.			
UNIT- IV		PROCESS ANDEQUIPMENTDESIGN Process Design – Equipment – Instrument – Selection – Concept Modules – Various Machine Tools -In-Built safety–Machine layout- Machine guarding- Safety devices and methods Selection, Inspection, Maintenance and safe usage– Statutory provisions, Operator training and supervision– Hazards and prevention.			
UNIT- V		MANMACHINESYSTEMS Job And Personal Risk Factors – Standards-Selection And Training-BodySize And Posture-Body dimension (Static/Dynamic)– Adjustment Range –Penalties – Guide Lines For Safe Design And postures-Evaluation AndMethods Of Reducing Posture Strain. Man-Machine Interface-Controls –Types Of Control- Identification And Selection-Types Of Displays-Compatibility and stereo types of important operations- Fatigue and vigilance-Measurement characteristics and Strategies for enhanced performance			
References <ol style="list-style-type: none"> 1. “AccidentPreventionManualforIndustrialOperations”,NSCChicago,1982. 2. “WorkStudy”,NationalProductivityCouncil,NewDelhi,1995. 3. E.J.Mc Cormick and M.S.Sanders “Human Factors in Engineering and Design”,TMH,NewDelhi,1982. 4. Hunter,Gomas,“EngineeringDesignforSafety”,McGrawHillInc.,1992. 5. IntroductiontoWorkStudy”,ILO,OxfordandIBHPublishingcompany,Bombay,199”. 					

Related online content(MOOC, Swayam, NPTEL, Web siteetc.)<https://www.youtube.com/watch?v=KNFZXNWYVno>

Course Outcomes		Knowledgelevel
CO-1	To descry be work procedure and application sinhazardous	K 1
CO-2	To Illustrate the human factors in design of Personal protective equipment	K2
CO-3	To Explain the risk factors ,guidelines for safe design of man machine systems considering human factors	K5
CO-4	To Justify the Guideline for safe design	K5
CO-5	To elaborate the Strategies for enhanced performance inMan Machine systems	K6

On what level it correlated with Cos &POs-based on that we have to give marks
Mapping Course Outcome Vs Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3(S)	2(M)	3(S)	2(M)	2(M)	3(S)	2(M)	3(S)	2(M)	3(S)
CO2	3(S)	3(S)	2(M)	2(M)	3(S)	3(S)	2(M)	3(S)	2(M)	3(S)
CO3	3(S)	2(M)	3(S)	2(M)	3(S)	3(S)	2(M)	2(M)	3(S)	2(M)
CO4	2(M)	3(S)	2(M)	3(S)	3(S)	2(M)	2(M)	3(S)	2(M)	3(S)
CO5	3(S)	2(M)	3(S)	3(S)	2(M)	3(S)	3(S)	2(M)	3(S)	2(M)
W.AV	2.8	2.4	2.6	2.4	2.6	2.8	2.2	2.6	2.4	2.6

S–Strong(3),M-Medium(2),L-Low(1)

Mapping Course Outcome Vs Programme Specific outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3(S)	2(M)	3(S)	3(S)	2(M)
CO2	2(M)	3(S)	2(M)	3(S)	2(M)
CO3	3(S)	2(M)	3(S)	3(S)	3(S)
CO4	2(M)	3(S)	2(M)	3(S)	2(M)
CO5	3(S)	2(M)	3(S)	2(M)	3(S)
W.AV	2.6	2.4	2.6	2.8	2.4

S–Strong(3),M-Medium(2),L-Low(1)

DIP (Rail Safety) IInd- Semester					
Core	Course Code: 84122	Fire Safety	T	Credits:4	Hours:5
Pre-requisite	Basic Knowledge of Fire Safety		Syllabus Revised	2023-2024	
Course Objectives	<ol style="list-style-type: none"> 1. To provide an in depth knowledge about the science of fire. 2. To understand the causes and effects of fire. 3. To know the various fire prevention systems and protective equipments. 4. To understand the science of explosion and its prevention techniques. 5. To understand the various fire prevention techniques to be followed in a building. 				
UNIT- I	FUNDAMENTALS OFFIRE SAFETY Introduction-Physical And Chemicals Properties Of Fire- Mode Of Heat Transfer-Flash Point-N Fire Point-Ait (Auto ignition Temperature- Flammable And Combustible-Fire Triangle-Fire Tetrahedron-Explosion Pentagon-Bleve-Classification Of Fire- Causes Of Fire-Extinguishing Methods-Fire Extinguisher-Fire Load Calculation-Hazardous Area classification- Fire Safety In Public Place, High Rise Building, Educational Institution, Shopping Malls, Chemical Labs, Warehouse and Garages				
UNIT - II	SELECTION, INSTALLATION & MAINTENANCE OF FIRE EXTINGUISHER Terminology-Classification Of Hazards-Number & Size Of Fire Extinguisher-Fire Extinguisher Size And Placement-Selection Of Location-Initial Inspection-Installation-Selection Of Fire Extinguisher-Suitability Of Fire Extinguisher-Inspection And Maintenance-Testing Of Fire Extinguisher-Maintenance Record-Rejected Extinguisher-Refilling-Spares-Maintenance-Checklist				
UNIT- III	SELECTION ,INSTALLATION AND MAINTENANCE OF FIRE DETECTION & ALARM SYSTEM Terminology-General requirements-Detection zone- Automatics fired detectors-Heat detector –Smoked detectors- Optical smoke Detectors-Air Sampling Detectors- Uv Flame Detectors-Ir Flame Detectors-Sitting Of Manual Call Points- Inspection & Maintenance-Test-System disconnecting During testing-Spares, Checklist				
UNIT- IV	INSTALLATION & MAINTENANCE OF INTERNAL AND EXTERNAL FIRE HYDRANTS Terminology-Hydrant Installation-Underground Static Water Tank-Terrace Tanks-Fire Pumps & Pump House-Risers-Fire service Inlet-Typical Fire Fighting Installations/Requirements-Size Of Mains-Hose Reels-Water Supplies & Pumping arrangements-Testing-Maintenance-Checklist				
UNIT- V	FIRE EXIT AND SPECIAL HAZARDS Introduction-Exit Requirements-Types Of Exits-Occupant Load- Capacity Of Exit-Arrangements Of Exits-Travel Distance-Number Of Exits-Fire Escape & Staircase –Flammable And Combustible Liquids- Upper And Lower Explosive Limits- Handling and storage of flammable & Combustible Liquids- Hot work activities-Hazards and precaution Steps.				

References

1. "Accident Prevention manual for industrial operations" N.S.C., Chicago, 1982.
2. "Davis Daniele 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"

Related online content (MOOC, Swayam, NPTEL, Website etc.)

<https://archive.nptel.ac.in/courses/105/102/105102176/>

https://onlinecourses.nptel.ac.in/noc20_ce09/preview

Course Outcomes		Knowledge level
CO-1	To Recall about basic concepts of fire and explosion science.	K1
CO-2	To Practice the operation of various types of fire extinguishers	K3
CO-3	To Summarise the different source of ignition and their prevention techniques	K3
CO-4	To Explain the students to effectively employee explosion protection techniques and their significances to suit the industrial requirement	K2
CO-5	To Interpret the emergency evacuation methods	K5

On what level it correlated with Cos & POs-based on that we have to give marks

Mapping Course Outcome Vs Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3(S)	2(M)	3(S)	2(M)	2(M)	3(S)	2(M)	3(S)	2(M)	3(S)
CO2	3(S)	3(S)	2(M)	2(M)	3(S)	3(S)	2(M)	3(S)	2(M)	3(S)
CO3	3(S)	2(M)	3(S)	2(M)	3(S)	3(S)	2(M)	2(M)	3(S)	2(M)
CO4	2(M)	3(S)	2(M)	3(S)	3(S)	2(M)	2(M)	3(S)	2(M)	3(S)
CO5	3(S)	2(M)	3(S)	3(S)	2(M)	3(S)	3(S)	2(M)	3(S)	2(M)
W.AV	2.8	2.4	2.6	2.4	2.6	2.8	2.2	2.6	2.4	2.6

S-Strong(3),M-Medium(2),L-Low(1)

Mapping Course Outcome Vs Programme Specific outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3(S)	2(M)	3(S)	3(S)	2(M)
CO2	2(M)	3(S)	2(M)	3(S)	2(M)
CO3	3(S)	2(M)	3(S)	3(S)	3(S)
CO4	2(M)	3(S)	2(M)	3(S)	2(M)
CO5	3(S)	2(M)	3(S)	2(M)	3(S)
W.AV	2.6	2.4	2.6	2.8	2.4

S-Strong(3),M-Medium(2),L-Low(1)

Diploma (Rail Safety) IstSemester					
CORE	Course Code: 84123	Standard on Rail Safety	T	Credits:5	Hours:10
Pre-requisite				Syllabus Revised	2023-2024
Course Objectives	1. To familiarize the basic information about IRIS 2. To educate on IRTS Standard 3. To learn about IRIS Certification Procedure 4. To provide knowledge about ISO/TS22163 Rail Quality Management 5. To learn about Occupational Health & Safety				
UNIT- I	INFORMATION ON IRIS Background-IRIS Benefits-Equipment manufacturers- System integrators- Operators-Guiding principles- Evaluation methodology evolutions of iris-Impact of Changes				
UNIT - II	CONTENT OF IRTS STANDARD Scope-Normative references terms & Definitions- Quality management system- Management responsibility-Resource management product realization measurement-Analysis & Improvement assessment methodology				
UNIT- III	IRIS CERTIFICATION PROCEDURE Organization Registration for membership at the uniportal-Compilation of information -Questionnaire-Pre- Audits to verify potential gaps in compliance with iris standard- Readiness review audits certification audit-Issue of certification-Annual Supervision audits-Recertification audits				
UNIT- IV	ISO/TS22163 RAIL QUALITY MANAGEMENT What is ISO/Ts22163-Why is ISO/Ts22163 important-Certification bodies-Leadership -Planning-Support-Operation-Performance Evaluation-Improvement				
UNIT- V	ISO 45001-OCCUPATIONAL HEALTH & SAFETY Introduction-Normative references- Leadership & Worker participation-Planning-Support operation-Performance evaluation-Improvement-Annex				
References					
1. The Factories Act, 1948-Universal Law Publishing Co Pvt Ltd, Delhi, 2011 2. The Public Liability Insurance Act, 1991-Universal Law Publishing Co Pvt Ltd, Delhi, 2011. 3. The Dangerous Machines Act, 1953-Universal Law Publishing Co Pvt Ltd, Delhi, 2011.					
Related online content (MOOC, Swayam, NPTEL, Website etc.)					
https://erp.iitkgp.ac.in/InfoCellDetails/resources/external/cepdata?course_id=IIT/CEP/STC/SP/2023-2024/RE/35 http://www.nitttrc.edu.in/nptel/courses/video/114106039/lec15.pdf					
Course Outcomes					Knowledge level
CO-1	To the basic concepts of IRIS				K1
CO-2	To summarize the knowledge about IRIS Standard				K2
CO-3	To Discuss the IRIS Certification Procedure				K4
CO-4	To Explain the ISO/TS22163 with Leadership planning and Support				K5
CO-5	To Elaborate the ISO 4500 1 with Performance evaluation and Improvement				K6

On what level it correlated with COs & POs -based on that we have to give marks
Mapping Course Outcome Vs Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3(S)	2(M)	3(S)	2(M)	2(M)	3(S)	2(M)	3(S)	2(M)	3(S)
CO2	3(S)	3(S)	2(M)	2(M)	3(S)	3(S)	2(M)	3(S)	2(M)	3(S)
CO3	3(S)	2(M)	3(S)	2(M)	3(S)	3(S)	2(M)	2(M)	3(S)	2(M)
CO4	2(M)	3(S)	2(M)	3(S)	3(S)	2(M)	2(M)	3(S)	2(M)	3(S)
CO5	3(S)	2(M)	3(S)	3(S)	2(M)	3(S)	3(S)	2(M)	3(S)	2(M)
W.AV	2.8	2.4	2.6	2.4	2.6	2.8	2.2	2.6	2.4	2.6

S–Strong(3),M-Medium(2),L-Low(1)

Mapping Course Outcome Vs Programme Specific outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3(S)	2(M)	3(S)	3(S)	2(M)
CO2	2(M)	3(S)	2(M)	3(S)	2(M)
CO3	3(S)	2(M)	3(S)	3(S)	3(S)
CO4	2(M)	3(S)	2(M)	3(S)	2(M)
CO5	3(S)	2(M)	3(S)	2(M)	3(S)
W.AV	2.6	2.4	2.6	2.8	2.4

S–Strong(3),M-Medium(2),L-Low(1)