SRM VALLIAMMAI ENGINEERING COLLEGE

(AN AUTONOMOUS INSTITUTION)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF CIVIL ENGINEERING

QUESTION BANK

II SEMESTER

1914201 FIRE ENGINEERING AND EXPLOSION CONTROL

(M.E. INDUSTRIAL SAFETY ENGINEERING)

Regulation – 2019

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Prepared by

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SUBJECT CODE/NAME: 1914201 FIRE ENGINEERING AND EXPLOSION CONTROL

SEM/YEAR: III/II

UNIT I - PHYSICS AND CHEMISTRYOF 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.			
PART A			
Q.NO	**QUESTIONS**	**BT LEVEL**	**COMPETENCE**
1.	What is the state of matter of fire?	BT-1	Remembering
2.	Is fire a solid, a liquid, or a gas?	BT-4	Analyzing
3.	Interpret the factors depending on the rate of flame spread?	BT-3	Applying
4.	What is fire?	BT-1	Remembering
5.	What are the various classes of fire?	BT-1	Remembering
6.	What is the difference between combustion and explosion?	BT-1	Remembering
7.	Is explosion a type of combustion?	BT-5	Evaluating
8.	What is Vapour cloud?	BT-1	Remembering
9.	Enumerate Flash Fire.	BT-2	Understanding
10.	Classify the different forms of fire.	BT-2	Understanding
11.	How does auto ignition occur?	BT-4	Analyzing
12.	Define BLEVE	BT-1	Remembering
13.	Examine the 5 beliefs that are commonly misunderstood for preventing a BLEVE.	BT-4	Analyzing
14.	Demonstrate the possible situations for fire fighter safety in BLEVE.	BT-3	Applying

15.	Explain flash fire how is it differ from jet fire.	BT-2	Understanding
16.	Explain about fire accidents?	BT-2	Understanding
17.	List some products of combustion.	BT-6	Creating
18.	Illustrate the difference between fire and flame.	BT-3	Applying
19.	Write about the toxicity of product of combustion	BT-5	Evaluating
20.	Elaborate about spontaneous combustion with example?	BT-6	Creating
PART B			
1.	Examine the various stages of Fire.	BT-4	Analyzing
2.	Explain the phenomenon of fire growth.	BT-1	Remembering
3.	Explain the phenomenon of fire spread.	BT-1	Remembering
4.	Discuss the theory of combustion and explosion.	BT-6	Creating
5.	Explain the hazard of BLEVE with a neat diagram.	BT-2	Understanding
6.	Write short note on flash fire, jet fire and pool fire.	BT-3	Applying
7.	Explain the different forms of fire according to fuel source in detail	BT-5	Evaluating
8.	Demonstrate about vapour cloud explosion.	BT-3	Applying
9.	List the different Flame colour with its type and temperature.	BT-1	Remembering
10.	What is Physics and chemistry of fire explain in detail?	BT-1	Remembering
11.	Illustrate the principle of combustion process in relation to fire.	BT-2	Understanding
12.	Examine the condition for the maintenance of combustion.	BT-4	Analyzing
13.	Discuss in detail about Piper Alpha.	BT-2	Understanding
14.	Describe in detail about Flixborough	BT-3	Applying
PART C			
1.	Describe Poly Ethylene plant explosion Pasadena case study.	BT-5	Evaluating
2.	Discuss Peterborough ship explosions and also bring out the lessons learnt from the case study.	BT-6	Creating
3.	Illustrate the Mexico disaster case studies.	BT-3	Applying
4.	Explain Bombay Victoria dock ship explosion case study.	BT-2	Understanding

UNIT II - FIRE PREVENTIONAND PROTECTION

Sources of ignition – fire triangle – principles of fire extinguishing – active and passive fire protection systems – various classes of fires – A, B, C, D, E – types of fire extinguishers – fire stoppers – hydrant pipes – hoses – monitors – fire watchers – lay out of stand pipes – fire station-fire alarms and sirens – maintenance of fire trucks – foam generators – escape from fire rescue operations – firedrills – notice-first aid for burns.

Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	What are causes of fire accidents?	BT-1	Remembering
2.	List the fire fighting agents.	BT-1	Remembering
3.	What is the fire triangle and how do we use it?	BT-1	Remembering
4.	What kind of first aid should be taken in fire burns?	BT-1	Remembering
5.	Lable the fire triangle	BT-3	Applying
6.	Illustrate about the flammable liquid	BT-3	Applying
7.	What are three sources of ignition?	BT-4	Analyzing
8.	Demonstrate the 4 steps in using a fire extinguisher?	BT-3	Applying
9.	Discuss about the 4 types of fire extinguishers?	BT-2	Remembering
10.	Describe about the different types of fire protection systems?	BT-2	Remembering
11.	What is meant by passive fire protection?	BT-1	Remembering
12.	Explain Active Fire Protection.	BT-2	Understanding
13.	Demonstrate a fire stopper?	BT 6	Creating
14.	List Is standard for fire hydrant system?	BT-4	Analyzing
15.	Interpret the pressure requirement & flow requirement of standpipe & sprinklers?	BT 6	Creating
16.	Why we cannot extinguish the fire of alcohol tank with water?	BT-4	Analyzing
17.	Define Siren	BT-1	Remembering
18.	Dos and Don'ts of First-Aid Burn.	BT-5	Evaluating
19.	When is a Fire watch required.	BT-5	Evaluating
20.	What is the objective of fire drill?	BT-2	Understanding
	PART B		
1.	Mention about the sources and controlling of ignition	BT-4	Analyzing
2.	Discuss the classes of fire	BT 6	Creating
3.	What are the various types of fire extinguishers	BT-1	Remembering
4.	Describe the factors affecting means of escape during fire.	BT-2	Understanding
5.	Explain the concept of fire triangle	BT-3	Applying
6.	Discuss in detail about fire protection systems.	BT-4	Analyzing
7.	Explain about burns and first aid procedure for burns.	BT-4	Analyzing
8.	Write short note on fire hydrant system	BT-1	Remembering
9.	Investigate the functions of fire alarms and sirens.	BT 5	Evaluating
10.	Explain about the case study in paper mill industry	BT-2	Understanding
11.	Describe when is fire watch required? What are the functions of Fire Watch?	BT-3	Applying
12.	What is Fire drill .Explain in detail about the fire drill?	BT-1	Remembering

13.	What is the root cause behind occurrence of fire accidents?	BT-1	Remembering
14.	Explain about the maintenance of fire trucks.	BT-2	Understanding
	PART C		
1.	Write short notes on Fire alarm systems and First aid burns.	BT-3	Applying
2.	Explain the recue and escape systems in fire accident.	BT-1	Remembering
3.	Brief about the fire safety certificates.	BT-2	Understanding
4.	Write briefly about Heat and smoke detectors.	BT-4	Analyzing

UNIT - III - INDUSTRIAL FIRE PROTECTIONSYSTEMS

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.

PART A

Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	Define reliability	BT 1	Remembering
2.	How does a deluge system work?	BT-3	Applying
3.	What are the types of sprinklers?	BT 1	Remembering
4.	What is the working principle of fire alarm system?	BT 1	Remembering
5.	Suggest under what situation CO_2 extinguisher used for?	BT 5	Evaluating
6.	What is dry chemical powder?	BT 1	Remembering
7.	Illustrate Dos and Don't in case of fire in building	BT 2	Understanding
8.	Define Smoke vents	BT 2	Understanding
9.	Distinguish between flammability and combustibility?	BT-4	Analyzing
10.	What are the types of fire fighting systems?	BT 1	Remembering
11.	What is portable fire extinguishers?	BT 3	Applying
12.	What is the purpose of a standpipe?	BT 4	Analyzing
13.	Discuss about smoke detector.	BT 2	Understanding
14.	Distinguish between dry riser and wet riser.	BT 4	Analyzing
15.	Define sprinkler head.	BT 1	Remembering
16.	Write about the various types of sprinkler heads that are commonly used.	BT 6	Creating

17.	What are the various precautions to be taken in the arrangement of automatic sprinkler system?	BT 5	Evaluating
18.	How Halon Fire Extinguishers is used.	BT 3	Applying
19.	What is Halon and How Does it Work?	BT 2	Understanding
20.	Write short note on flammability?.	BT 6	Creating
PART B			
1.	Discuss about CO_2 fire suppression system.	BT 1	Remembering
2.	Explain foam system for fire protection.	BT 2	Understanding
3.	Explain about fire detection and alaram system.	BT 2	Understanding
4.	Explain the classification of foam concentrates.	BT 2	Understanding
5.	What is stand pipe? Examine about the different types of Stand Pipe system?	BT 4	Analyzing
6.	Describe about the selection criteria of deluge fire suppression system.	BT 5	Evaluating
7.	List the types and uses of portable fire fighting extinguishers.	BT 1	Remembering
8.	Interpret Fusible Link Sprinklers vs. Glass Bulb Sprinklers	BT 3	Applying
9.	Demonstrate about the different types of Sprinkler system.	BT 3	Applying
10.	Illustrate industrial active fire protection system in detail.	BT 4	Analyzing
11.	Write about Halon fire suppression system.	BT 3	Applying
12.	List few specification regarding siting of portable extinguishing equipment.	BT 1	Remembering
13.	Write the application of dry chemical powder system.	BT 1	Remembering
14.	Give an account on automatic sprinkler system.	BT 6	Creating
PART C			
1.	Illustrate about the Do's and Don't in case of fire in building	BT 3	Applying
2.	Explain how the sprinklers systems for fire prevention and fighting for LPG storage.	BT 6	Creating
3.	Explain in detail about industrial fire protecting systems.	BT 2	Understanding
4.	Why alarm and detection systems are required.	BT 5	Evaluating

UNIT IV - 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 - exists – width calculations - fire certificates – fire safety requirements for high rise buildings –snookers.

PART – A			
Q.NO	**QUESTIONS**	**BT LEVEL**	**COMPETENCE**
1.	How to Calculate Fire Load?	BT 3	Applying
2.	Define Fire loading	BT 1	Remembering
3.	List Fire-retardant materials used in buildings.	BT 1	Remembering
4.	What is the result of Fire test	BT 5	Evaluating
5.	What is Fire Safety Certificate?	BT 1	Remembering
6.	Why is fire safety awareness important?	BT 4	Analyzing
7.	What are means of egress?	BT 2	Understanding
8.	How many means of egress are required?	BT 2	Understanding
9.	Explain Structural integrity	BT 3	Applying
10.	What is the minimum width on escape route?	BT 5	Evaluating
11.	What is the meaning of fire exit?	BT 3	Applying
12.	What are snorkel ladder.	BT 4	Analyzing
13.	List the different types of sprinkler heads used depending on the hazard predicted.	BT 4	Analyzing
14.	List the various structures where automatic sprinkler systems are commonly installed.	BT 1	Remembering
15.	What are the significant toxic gases that are produced during fire?	BT 1	Remembering
16.	Select any two recommendation as per NBC with respect to fire safety.	BT 2	Understanding
17.	Write about the fire escape element in building	BT 6	Creating
18.	Write at least three special design considerations to be considered for physically handicapped and elderly people with respect to fire safety.	BT 6	Creating
19.	Explain the significance of fire lighting.	BT 2	Understanding
20.	How will you locate escape lighting?	BT 1	Remembering
PART – B			
1.	Explain the structural fire protection to ensure building fire safety.	BT 2	Understanding
2.	Discuss fire safety requirements for high rise buildings.	BT 6	Creating
3.	Describe about the fire investigation basis.	BT 1	Remembering
4.	Explain about heat, smoke detectors and fire alarm system.	BT 2	Understanding
5.	Discuss about the concept of egress design in fire safety.	BT 6	Creating
6.	Enumerate the advantages of snookers in high rise buildings	BT 3	Applying
7.	As a safety officer how do you get the NOC-no objection certificate from the divisional fire to a new high rise building?	BT 4	Analyzing
8.	List out the objectives of fire safe building design.	BT 1	Remembering

9.	What are the requirements of fire lighting?	BT 4	Analyzing
10.	Explain fire prevention measures to be implemented when building is occupied.	BT 2	Understanding
11.	Explain the factors affecting fire resistance on different materials.	BT 5	Evaluating
12.	Illustrate Fire resisting properties of common building materials.	BT 3	Applying
13.	List and explain in detail about Non combustible materials.	BT 1	Remembering
14.	Plan Special features required for physically handicapped and elderly in various building types.	BT 3	Applying
PART C			
1.	Discuss about the basic principle of fire safe building design in detail.	BT 6	Creating
2.	Describe about a fire safety requirements for high rise buildings.	BT 2	Understanding
3.	Write about the Safety regulations as per NBC.	BT 3	Applying
4.	Evaluate the Fire safety certificate checklist for a high rise building.	BT 4	Analyzing

UNIT V - EXPLOSION PROTECTING SYSTEMS

Principles of explosion-detonation and blast waves-explosion parameters – Explosion Protection, 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.

PART – A

Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	What does compressed gas mean?	BT 1	Remembering
2.	What are objective of fire ventilation.	BT 1	Remembering
3.	Distinguish between fire and explosion?	BT 4	Analyzing
4.	How does a blast wave work?	BT 1	Remembering
5.	Discuss about Flame arrestor	BT 6	Creating
6.	Write about the six noble gases with their atomic numbers.	BT 3	Applying
7.	What is the use of Flame Arrester	BT 5	Evaluating
8.	Examine the causes of dust explosion?	BT 4	Analyzing
9.	What are the types of explosives?	BT 2	Understanding
10.	Write about the Explosive substances.	BT 3	Applying
11.	What is a PSV valve?	BT 3	Applying
12.	State why do we use ruptured discs?	BT 1	Remembering
13.	Discuss about the Hazards of LPG.	BT 2	Understanding
14.	How dangerous is ammonia gas?	BT 5	Evaluating

15.	Is Sulphur dioxide a poisonous gas?	BT 2	Understanding
16.	Explain the hazards of chlorine?	BT 6	Creating
17.	Discuss about fire suppression system	BT 2	Understanding
18.	How does waterless fire suppression system work?.	BT 1	Remembering
19.	List common materials involved in explosion.	BT 1	Remembering
20.	Difference between a fire and an explosion?	BT-4	Analyzing
	PART – B		
1.	What are explosion parameters? Explain.	BT 1	Remembering
2.	Explain the Explosion suppression system based on CO_2 and Halons.	BT 1	Remembering
3.	Write a note on hazards in LPG.	BT 3	Applying
4.	Explain about gaseous fire suppression systems.	BT 5	Evaluating
5.	Explain the working principle and types of flame arrestors.	BT 2	Understanding
6.	Write short notes on mechanism of explosions.	BT 3	Applying
7.	State the principles of explosion protection system in detail.	BT 4	Analyzing
8.	Explain the phenomenon, parameters, causes and control measures of explosion, detonation and blast waves.	BT 2	Understanding
9.	Discuss in detail about the following terms. (i) Deflagration (4) (ii) Detonation (4) (iii) Explosion Limits. (5)	BT 6	Creating
10.	Examine the principle of controlling explosion.	BT 4	Analyzing
11.	Explain about Flammable materials.	BT 2	Understanding
12.	List the various classes of hazardous area.	BT 1	Remembering
13.	Briefly discuss about the Hazards in ammonia gas storage.	BT 1	Remembering
14.	Explain the condition in which flashover and backdraught may occur.	BT 3	Applying
	PART – C		
1.	Briefly discuss in detail about various Ventilation Methods	BT 1	Remembering
2.	Demonstrate a case study on the suppression system for a building with gases.	BT 3	Applying
3.	Explain the following in detail (i) Primary explosion protection (5) (ii) Secondary explosion protection (5) (iii)Tertiary explosion protection (5)	BT 2	Understanding
4.	Prepare an emergency preparedness plan to deal with emergencies of hazards due to LPG leakage in an industry.	BT 6	Creating

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