

Indian Maritime University
End Semester Examination /B.Tech (ME)
Fire Prevention & Control (UG11T3601)

June 2022

70 Marks

Time: 3 Hrs

Date: 02.06.2022

Pass Marks-35

It is compulsory to answer Part A & Part B and answer any 5 from Part C.

1 (Part A) Compulsory to answer 10 MCQs (**10 X 01** Mark)

(i) Fire triangle was replaced with fire tetrahedron to include

- (a) Source of heat.
- (b) Chain reaction
- (c) Effect of wind
- (d) None of the above

(ii) Seating around a camp fire, heat is transmitted to us mainly by

- (a) Convection
- (b) Conduction
- (c) Radiation
- (d) All of the above

(iii) As per FSS code, Ship's automatic sprinkler system should operate within temperature range.

- (a) 57 - 67 deg C
- (b) 68 - 79 deg C
- (c) 78 - 88 deg C
- (d) 89 - 98 deg C

(iv) Minimum number of hoses required to be carried (excluding engine room requirement) in a cargo ship of 1000GT and above is

- (a) 3
- (b) 5

(c) 7

(d) None of the above

(v) Which of the following devices of IG system prevents back flow of hydrocarbon to engine room.

(a) PV breaker

(b) PV valve

(c) Deck seal

(d) All of them

(vi) Fire detector which has the fastest response time is

(a) Heat detector

(b) Smoke detector

(c) Ionised smoke detector

(d) Flame detector

(vii) Most suitable fix fire fighting installation on LMG carrier is

(a) Foam & Water mist

(b) CO₂& Water mist

(c) Dry chemical Powder& Water mist

(d) None of above

(viii) Which of the following statement is false for 'means of escape'.

(a) At least 2 widely separated escape passage to be provided.

(b) Lift can be considered as one of the means of escape.

(c) Doors in the escape passage should normally open in way of the escape direction.

(d) One of the escape ladders from engine room should be located within protected enclosure.

(ix) As per SOLAS, minimum number of fire drill each crew member should attend in a month.

(a) 1

(b) 2

(c) 3

(d) 4

(x) The explosive range of a mixture of flammable vapours is specified as a percentage of:

- (a) Oxygen present to support combustion.
- (b) The temperature of the flash point.
- (c) Flammable vapour by volume in air.
- (d) The lower limit of explosivity of the mixture

2. Part B – Compulsory to answer all 5 Short Questions (05 X 02 Marks)

- (i) What is the difference between Flash point and Ignition point.
- (ii) Sketch graphic symbols of following (mention colour in text):
 - (a) Class B sliding fire door
 - (b) Fire pump
 - (c) Fire plan
 - (d) Fire damper for accommodation.
- (iii) State the differences between class A-15 (15 min) and class B-15 (15 min) bulkheads.
- (iv) What is the meaning of expansion ratio & dilution rate of foam fire extinguisher?
- (v) Explain the differences between explosion proof and intrinsically safe instruments.

Part C – Answer Any 5 from this part (**05 X 10** Marks)

3. (a) Why is it required to classify fire? State the different classes of fire as per NFPA.
(b) Write the safety objectives as stated in Regulation 2 of SOLAS II-2
(c) Write a note on health hazards associated with fire. **(4+3+3)**
4. (a) Why & how the ship is divided into fire zones? What determines the type of bulkhead to be used.
(b) Discuss the general requirements for escape passages.
(c) Write a note on Fire doors. Mention the regulatory requirements for operation of different fire doors. **(4+3+3)**
5. (a) What is the purpose & requirements of fire detection & alarm system in ship? Name different types of fire detectors used in ship.
(b) Sketch & describe working of a combined heat detector (fixed & rate of rise in temperature).
(c) As per FSS code what are the requirements of power source for fire detection & alarm system. What is the activation range for smoke and heat detector? **(4+3+3)**

6. (a) Describe operation of IG system using boiler flue gas with the help of block diagram.

(b) What is gas freeing of tank? In order to gas free an inert empty tank Chief-Officer asks for IG initially instead of fresh air, explain with diagram why IG is required. **(6+4)**

7.(a) What are the advantages & disadvantages of bulk CO₂ system over conventional CO₂ flooding system.

(b) Explain function and operation of time delay unit of CO₂ flooding system

(c) Considering each cylinder contains 45 kg of CO₂. Calculate the minimum number of CO₂ filled cylinders required to be kept in CO₂ room to protect Engine room having gross volume 2150 m³ with casing and 1800 m³ without casing.(Volume of free CO₂ is 0.56m³/kg). **(3+3+4)**

8. (a) What is muster station & where should it be located?

(b) State the purpose & nature of general alarm & fire alarm. Where are their activation points?

(c) What is the purpose of first aid? Explain ABC of first aid. **(3+3+4)**

9. (a) Fire in engine room has gone out of control and it is decided to use CO₂ flooding. Discuss the steps taken before releasing CO₂ and the procedure followed for re-entry.

(b) What annual maintenance is carried out on portable fire extinguisher?

(c) What is the amount of spare charge for portable extinguisher is required to be carried in ship. **(6+3+1)**

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