UPES
End Semester Examination, Dec. 2023

Course: Fire Engineering III   Semester: V
Program: B.Tech (Fire & Safety Engineering)   Time: 03 hrs.
Course Code: HSFS 3027   Max. Marks: 100

Instructions: All questions are compulsory to attempt.

	SECTION A (5Qx4M=20Marks)		
S. No.	Answer all the questions.	Marks	CO
Q 1	Enlist the parameters affecting the fire resistance rating of a building material.	4	CO1
Q 2	Brief of guniting or shotcreting used as a repair technique maintaining the structural integrity.	4	CO3
Q 3	What do understand by fire protection of wooden structure.	4	CO2
Q 4	Fire screens are used to decrease the intense heat transfer and restrict spread of fire. Brief about fire resistance screen and its application.	4	CO1
Q 5	Explain the effect of temperature on masonry.	4	CO2
	SECTION B (4Qx10M= 40 Marks)		
Q 6	Examine about fire zonation in a city and its necessity.	10	CO4
Q 7	Determine the time to general failure and localized failure of the timber floor of 19 mm thick under sprinkler failure scenario. (Assume average charring rate of wood = 0.009 mm/s, Timber density= 600 kg/m^3).	10	CO2
Q 8	Create an inspection checkpoint for verifying building materials to be used as a fire protection material against any severe fire.	10	CO5
Q 9	Describe various methods to determine structural damage due to fire for concrete and steel members. OR Explain various reparability technique in details and responsibility of team members involved in it.	10	CO3
	SECTION-C (2Qx20M=40 Marks)		
Q 10	Explain the following terms: (i) Low combustible door (ii) Spark proof door (iii) Non-combustible door (iv) Steel plate door (v) Automatically activated fire door closer	5x4=20	CO2

Q 11	(i)	Using Thomas flashover criterion, calculate the heat release rate necessary to cause flashover in a room 6 m by 4 m floor area, and 4 m high, with two windows 2 m by 2 m and 1 m by 1 m respectively. $$\dot{Q}_{fo} = 0.0075A_t + 0.378A_v\sqrt{H_v}$$		
	(ii)	Calculate the average heat release rate when 200 kg of paraffin wax burn in one hour. Assume the calorific value of paraffin wax is 46 MJ/kg. OR		
	(i)	A building has a square plan with a floor area of 400 m^2 and has windows on opposite walls. If the fire load of the building is 70 kg/m^2 with a window opening of 40%, and the floor to ceiling height as 3.0 m, calculate the fire resistance period required for the building.	**10+10=20**	**CO4**
	(ii)	Instead of square plan, if the plan is rectangular and the length of wall which is not having window opening is 10 m and 40 m, compare the respective fire resistance period required for the building.		