Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, July 2020

Course: Fire Engineering III (Material & Fire Control) **Semester: VI**
Program: B Tech- Fire & Safety Engineering **Time 03 hrs.**
Course Code: HSFS 3009 **Max. Marks: 100**

Instructions: Attempt All Questions.

MC	Lightweight aggregate mainly consisting of------	Expanded Clay	Incorrect	Shale	Incorrect	Slag	Incorrect	All	Correct
MC	Siliceous aggregate, mainly consisting of-------	Silica	Correct	Sand	Incorrect	Soil Content	Incorrect	None	Incorrect
TF	If the roof panels are covered with gypsum board, the thickness of the gypsum board need to be converted to an equivalent thickness.	TRUE	Correct	FALSE	Incorrect				
MC	The equivalent thickness depends on the thickness of the ----- and the type of ------.	Board, Density	Incorrect	Gypsum board, Concrete	Correct	Types of Board, Filler Material	Incorrect	All	Incorrect
MC	If the gypsum board covers a siliceous or carbonate concrete, the equivalent thickness is --------- times the thickness of the gypsum board.	3	Correct	2	Incorrect	1	Incorrect	1.5	Incorrect
MC	If the gypsum board covers a sand-lightweight or lightweight concrete, the equivalent thickness is ---------- times the thickness of the gypsum board.	3	Incorrect	2 ¼	Correct	2	Incorrect	None	Incorrect
TF	Clay masonry units are larger than a brick and made of either clay or shale	TRUE	Correct	FALSE	Incorrect				
MC	Fire resistance rating of masonry block can be determined based on the----------.	Aggregate type	Incorrect	Equivalent thickness	Incorrect	Cavity fill	Incorrect	All	Correct
TF	The equivalent thickness of the masonry unit is determined by dividing the net volume by the surface area of the unit.	TRUE	Correct	FALSE	Incorrect				

TF	Fire resistance rating of unprotected structural steel depends on the W/D of the column.	TRUE	Correct	FALSE	Incorrect				
MC	Chemical changes in wood are ------ are specific to wood	Decomposition and Charring	Correct	Charring	Incorrect	Dryness	Incorrect	All	Incorrect
MC	Spalling happens in concrete are the------effects.	Physical	Correct	Chemical	Incorrect	Physical & Chemical	Incorrect	All	Incorrect
MC	Decomposition and Charring may happens in the building material such as--------	Concrete	Incorrect	Steel	Incorrect	Wood & Plastics	Correct	All	Incorrect
MC	Thermal conductivity determines the ---------- in the materials	Rate of heat transfer	Correct	Rise in Temp	Incorrect	Moluecular Displacement	Incorrect	All	Incorrect
MC	Specific heat determines the ---------- of a material for a given rise in temperature	Rate of heat transfer	Incorrect	Heat absorption capacity	Correct	Both	Incorrect	None	Incorrect
MC	---------- determines the temperature distributions that will exist in a material at various points in time during a fire.	Thermal Conductivity	Incorrect	Thermal Capacity	Incorrect	Thermal Diffusivity	Correct	Specific Heat Capacity	Incorrect
MC	The stiffness of a material is defined as the force required for a unit deformation, measured by the ---------.	Young's Modulus of Elasticity	Correct	Thermal Capacity	Incorrect	Thermal Diffusivity	Incorrect	All	Incorrect
TF	Creep is the strain (i.e. deformation per unit length) that occurs in materials with time.	TRUE	Correct	FALSE	Incorrect				
TF	Most materials the creep rate decreases significantly at high temperatures	FALSE	Correct	TRUE	Incorrect				
TF	Thermal expansion is measured by the strain induced by unit degree rise in temperature.	TRUE	Correct	FALSE	Incorrect				
MC	The rate of heating of steel depends upon the parameters of----------.	Thermal Conductivity	Incorrect	Specific Heat	Incorrect	Density	Incorrect	All	Correct
MC	Phase changes occurs in steel at and above temp ----------.	430◦C	Incorrect	540◦C	Incorrect	630◦C	Incorrect	730◦C	Correct

TF	The thermal properties of concrete depend upon the aggregate type used, due to chemical changes (crystal structure) in aggregate compounds.	TRUE	Correct	FALSE	Incorrect				
MC	Types of aggregates are----------.	Siliceous aggregates	Incorrect	calcareous aggregates	Incorrect	lightweight aggregates	Incorrect	All	Correct
TF	The thermal diffusivity of Low Weight Concrete is only slightly above than Normal Weight Concrete.	FALSE	Correct	TRUE	Incorrect				
TF	The coefficient of thermal expansion of concretes is of the same order as of steel.	TRUE	Correct	FALSE	Incorrect				
TF	The strength loss in concrete is slow because of the low thermal diffusivity.	TRUE	Correct	FALSE	Incorrect				
MC	The intensity of spalling generally depends upon the type of----------.	Aggregates used	Incorrect	Compressive Strength	Incorrect	Both	Correct	Mechanical Loading	Incorrect
MC	Grey color of concrete may appear at the temp----------	340◦C	Incorrect	300◦C	Correct	440◦C	Incorrect	None	Incorrect
TF	Compressive strength reduces at a higher rate than tensile strength.	TRUE	Correct	FALSE	Incorrect				
TF	Timber does not expand on heating like steel and concrete and therefore does not threaten adjoining masonry in the same manner.	TRUE	Correct	FALSE	Incorrect				
MC	The masonry failures due to ----------.	High walls with low slenderness ratio	Incorrect	Lack of lateral support	Incorrect	Differential heating due to a progressive pre-flashover fire	Incorrect	All	Correct
MC	Masonry can also suffer integrity failure when ------ are excessive.	Fire loads	Incorrect	Fire Load Density	Incorrect	Both	Correct	None	Incorrect
TF	Bricks can withstand temperatures of around a 1000◦C and they melt at about 1400 ◦C	TRUE	Correct	FALSE	Incorrect				

TF	Non-absorbing oxygen by creating smothering atmosphere round the flames is the method used to extinguish the fire in class B.	FALSE	Correct	TRUE	Incorrect				
MC	Fire-fighting medium for class E fire is to be ----------	Non-coductive	Incorrect	Non-Magnetic	Incorrect	Both	Correct	None	Incorrect
MC	The ------materials will lose their mechanical strength and their physical shape very quickly when heat is applied	Thermosetting	Incorrect	Thermoplastic	Correct	Resins	Incorrect	Binders	Incorrect
MC	Maximum temperature of softening & decomposition of thermoplastic is about --------.	300-400oC	Correct	300-500oC	Incorrect	140-250oC	Incorrect	None	Incorrect
MC	The ------formed by rolling and has an embedded wire mesh to prevent shattering and to withstand fire exposure	Wired Glass	Correct	Float Glass	Incorrect	Laminated Glass	Incorrect	Tempered Glass	Incorrect
MC	When a window pane of ordinary float glass is first heated, it tends to crack when the glass reaches a temperature of about --------.	250 - 350ºC	Incorrect	150 - 200ºC	Correct	450 - 550ºC	Incorrect	150 - 350ºC	Incorrect
MC	A 3 mm window glass will break when exposed to temperature around------- degree.	240	Correct	340	Correct	440	Incorrect	540	Incorrect
MC	Double-glazed windows using 6 mm glass can be expected to break out at about------.	300	Incorrect	400	Incorrect	500	Incorrect	600	Correct
MC	The condition of a fire, which is related to the maximum temperature reached and to the duration of burning is called --------	Fire Intensity	Incorrect	Fire Severity	Correct	Fire Fire Load	Incorrect	Fire Density	Incorrect
MC	Based on the amount of air available, different fire behaviors are noticed are called as-----	Ventilation Contrpl Fire	Incorrect	Fuel control fire	Incorrect	Both	Correct	None	Incorrect
MC	The transition from ventilation controlled fire to fuel controlled fire takes place approximately at a fire load per unit window opening of ----------for a fire with wood crib as combustible material.	100 kg/m^2	Incorrect	120 kg/m^2	Incorrect	260 kg/m^2	Incorrect	160 kg/m^2	Correct
MC	The transmission of fire from a building to another building can be due to the transmission of heat by----	Conduction	Incorrect	Convection	Incorrect	Radiation	Incorrect	All	Correct
TF	The flying bands can create secondary fires if the surfaces of the receiving buildings have inferior fire characteristics with respect to ignitability, flame prevention and flame spread	TRUE	Correct	FALSE	Incorrect				
MC	The amount of heat radiated from the surface of a building depends on---	Degree of Compartmentation	Incorrect	Fire load in Compartmentation	Incorrect	Area of Opening of wall	Incorrect	All	Correct
TF	If fuel load is in excess of 150 kg/m^2, then the fire will become ventilation controlled fire	TRUE	Correct	FALSE	Incorrect				

TF	Floor Area Ratio (FAR) is the ratio of the total covered area (plinth area) on all the floors to the plot area	TRUE	Correct	FALSE	Incorrect				
MC	Dikes, Mounds, Embankments, Ditches, Drains, Diaphragms are	Local Partition	Correct	General Partition	Incorrect	Both	Incorrect	None	Incorrect
TF	Area of combustible is larger than fire areas	FALSE	Correct	TRUE	Incorrect				
MC	While calculating area of combustible, Beta is ----------	Rate of combsution	Incorrect	Volume co-efficient	Correct	Co-efficient of fire resistance	Incorrect	All	Incorrect
TF	*Fire separation* between buildings is intended to *prevent the spread of fire* to adjacent buildings and installations as well as to provide insufficient space for the fire fighting operation.	FALSE	Correct	TRUE	Incorrect				
MC	The safety condition can be expressed by the equation q_t £ q_{min} for asafe distance from intensity of radiation	TRUE	Correct	FALSE	Incorrect				
MC	Fire walls, floors, screens and fire separations are	Local Partition	Incorrect	General Partition	Correct	Both	Incorrect	None	Incorrect
MC	Screens can be of ------- types	Fixed	Incorrect	Portable	Incorrect	Both	Correct	None	Incorrect
MC	Effectiveness of screens depends on-------	Surface Area	Incorrect	Distance between walls	Incorrect	Thermal conductivity	Incorrect	All	Correct
TF	Heat transferred to a structural element in a real fire is greater than in the furnace even if the real fire produces the temperature time curve specified for the standard test	TRUE	Correct	FALSE	Incorrect				
TF	Thermal density in any structural fire is inversely propotional to surface area of structure	Flase	Correct	TRUE	Incorrect				
TF	Coefficient of fire resistance is inversely propotional to duration of fire.	TRUE	Correct	FALSE	Incorrect				
TF	While calculating duration of fire, densities of combustible material is inversely proportional to specific heat of fire.	TRUE	Correct	FALSE	Incorrect				
MC	Occupancies of fire load less than or equal to 275000 kcal / m2 can be considered under the categories of --------	Low Fire Load	Correct	Moderate Fire Load	Incorrect	High Fire Load	Incorrect	None	Incorrect

MC	Occupancies of Fire Load > 275000 but < 550000 kcal / m^2 will be categorised under the ---------	Low Fire Load	Incorrect	Moderate Fire Load	Correct	High Fire Load	Incorrect	None	Incorrect
TF	Ridges are usually made by projecting the fire walls and floors	TRUE	Correct	FALSE	Incorrect				
MC	Fire stops include ----------	Itumuscent	Incorrect	Mortars	Incorrect	Silicone	Incorrect	All	Correct
MC	openings are to be protected by vertical enclosures with the FRR----- hrs	1	Incorrect	2	Correct	3	Incorrect	None	Incorrect
MC	-------- doors are used in places where the friction between the moving parts may cause danger like the door for the storage of explosives.	Solid	Incorrect	Spark Proof	Correct	Fire Resistance	Incorrect	All	Incorrect
MC	Door casings are covered with -------- steel	Galvanized	Correct	Mild	Incorrect	Both	Incorrect	stainless	Incorrect
MC	Usually metallic doors can be considered as ------- doors.	Non-combustible	Correct	Combustible	Incorrect	Both	Incorrect	None	Incorrect
MC	Minimum thickness of steel plate door is----------	3 mm	Incorrect	5 mm	Incorrect	6 mm	Correct	All	Incorrect
MC	Maximum area of composite fire door is -------metre square	3.2	Incorrect	4.2	Incorrect	5.2	Correct	None	Incorrect
MC	Maximum height of composite fire door is ----------metre	2.74	Correct	3.74	Incorrect	3.5	Incorrect	All	Incorrect
MC	Maximum width of compostite fire door is -------metre	1.44	Incorrect	2.44	Correct	3.44	Incorrect	4.44	Incorrect
MC	Spacing of hinges should not be more than ------ mm for metal covered door	600	Incorrect	700	Incorrect	800	Incorrect	900	Correct
TF	The bolts and latches shall be so arranged that the door can be opened from either sides.	TRUE	Correct	FALSE	Incorrect				
TF	The effectiveness of partitioned fire areas in preventing the spread of fire depends on the efficient design of fire area itself.	TRUE	Correct	FALSE	Incorrect				
TF	Connecting structures are required to be constructed with non-combustible materials	TRUE	Correct	FALSE	Incorrect				
MC	A horizontal projection of floor by about ------- helps in preventing the spread of fire to upper floors	1 Mtr	Incorrect	1.12 Mtr	Incorrect	1.2 Mtr	Correct	1.5 Mtr	Incorrect
MC	The density of Silicate fiber boards vary from ----- kg/m^3 to ------= kg/m^3	300, 800	Incorrect	400, 900	Incorrect	180, 1300	Incorrect	All	Correct

TF	Calcium Silicate Board can be used as indoor partition boards	TRUE	Correct	FALSE	Incorrect				
MC	Organic mineral content included upto ---------% in calcium silicate boards	3 to 10	Correct	7 to 10	Incorrect	3 to 15	Incorrect	All	Incorrect
MC	$CaSO_4.2H_2O$ is----------	calcium sulphate dihydrate	Incorrect	Gypsum	Incorrect	both	Correct	Perlite	Incorrect
MC	Thickness of gypsum board varies between ----- mm to ----- mm.	1 , 13	Incorrect	9.5, 25	Correct	5 , 20	Incorrect	All	Incorrect
MC	Protective devices are--------	Sprinklers	Incorrect	Drenches	Incorrect	RCC frames	Incorrect	All	Correct
MC	In this equestion T- To = 345 log10 (8t+1), t is	Furnace temp	Incorrect	Initial temp	Incorrect	Time	Correct	None	Incorrect
MC	Test procedure described in the IS Code	3409	Incorrect	3309	Incorrect	3809	Correct	3709	Incorrect
TF	Heat transferred to a structural element in a real fire is greater than in the furnace	TRUE	Correct	FALSE	Incorrect				
MC	Fire resistance test on separating elements of building, the code recommends an over pressure of	10 ± 5 Pa	Incorrect	1 N/m^2	Incorrect	Both	Correct	None	Incorrect
TF	The furnaces are fire chambers equipped with heating and mechanical loading devices for the test specimen	TRUE	Correct	FALSE	Incorrect				
TF	it is not recommended to eliminate the creep deformations during testing	FALSE	Correct	TRUE	Incorrect				
MC	In case of a separating element, its ---------- and **integrity** are to be observed	Load Bearing	Incorrect	Fire Load	Incorrect	Insulation Capacity	Correct	Heating	Incorrect
MC	For separating elements---------- are essential	Integirity failures	Correct	Joints	Incorrect	Holes	Incorrect	All	Incorrect
MC	During integrity test, cotton pads are placed on the unexposed surfae at the distance of----	20 mm-30 mm	Correct	10 mm-20 mm	Incorrect	30 mm-40 mm	Incorrect	None	Incorrect
TF	During failure criteria for insulation capacity, the sustained flaming with a duration of at least 10 seconds appears on the unexposed face	TRUE	Correct	FALSE	Incorrect				
TF	The dimensions of the critical cross-sectional area are called the critical dimensions	TRUE	Correct	FALSE	Incorrect				

TF	The duration of a fire in a compartment cannot be considered as the basis of deciding the fire resistance limit of structures	FALSE	Correct	TRUE	Incorrect				
MC	In the formula q = z βc Qe n, z is----------	Coefficient of incomplete chemical combustion	Incorrect	0.9 for liquid hydrocarbon	Incorrect	Both	Correct	0.79-0.90 for solid combustibles	Incorrect
MC	Specified limit of fire resistance in hours is----	k_o	Incorrect	L_s	Correct	Both	Incorrect	None	Incorrect
MC	During hot & cold cycles of soaking, elements are immersed under for a maximum period of ----------hours.	10	Incorrect	12 hrs	Incorrect	20	Incorrect	24	Correct