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

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2019

Course: Health Safety Environment for Power Industry **Semester: IV**
Program: MBA – Power Management **Time: 03 Hours**
Course code: PIUI 8007 **Max. Marks: 100**
Instructions:

SECTION A **(5 * 4 = 20 Marks)**

	Attempt All Questions	Marks	CO
Q 1	Conceptually explain the reasons of the Electricity Accidents in Electricity Power system & industries.	**4**	**CO1**
Q2	Draw and explain the fire triangle, Class of fires, types of fire extinguishers and firefighting concepts, R.A.C.E & P.A.S.S.	**4**	**CO1**
Q3	Describe and Explain the Environmental Impact Assessment overview, with E.I.A. framework diagram with importance of E.I.A	**4**	**CO1**
Q4	Draw the diagram and explain Waste to Energy plant diagram and explain the advantages of W.T.E plants.	**4**	**CO1**
Q5	Conceptually explain ISO 14001 and ISO 9001 in meeting the Organization objectives.	**4**	**CO2**

SECTION B **(4 * 5 = 20 Marks)**

	Attempt All Questions		
Q6	Analyse the Health Safety Environment (H.S.E) policy of an Electricity power company.	**5**	**CO2**
Q7	Analyse the effect of Electricity current on Human Body in respect to current/duration of shock/and effects on Human Body.	**5**	**CO2**
Q8	Analyse the emergency preparedness at Nuclear Power Plants pertaining to zoning concepts and emergency planning.	**5**	**CO2**
Q9	Analyse all the Do and Don'ts while working with the Electricity Systems and Various Appliances.	**5**	**CO3**

SECTION-C **(3 * 10 = 30 Marks)**

	Attempt Any three Questions		
Q10	Analyze & explain the objectives of Disaster Management and Draw and Explain the Circle Diagram of Natural Disaster Management.	**10**	**CO3**
Q11	Analyze & explain the Additional Safety Requirements for H.V.D.C. and Solar Park Installations as per the Electricity latest regulations.	**10**	**CO3**
Q12	Analyse general safety requirements in Electricity Supply lines and apparatus pertaining to construction, installation, protection, operation & maintenance.	**10**	**CO3**

Q13	Integrate, Analyse and Define Occupational Health, its Goals, Objectives and Functions of Occupational Health Services.	**10**	**CO3**
	SECTION-D **(2 * 15 = 30 Marks)**		
	Attempt All Questions		
Q14	Apply and analyze all essential elements of a Successful Health, Safety and Environmental (H.S.E.) Management system which help to organize an effective and efficient system in an Electrical Power Industry.	**15**	**CO4**
Q15	Study the Case given below of "Water Shortage Put Asian Power Sector at Risk", And Answer the following questions. Thermal and hydro power plant locations and water stress levels in India, Thailand, Vietnam, Malaysia, and the Philippines. More than half of existing and planned power plants in South and Southeast Asia are located in areas currently considered water scarce or stressed, according to findings in a report released today by the World Resources Institute (WRI) and HSBC's Climate Change Centre of Excellence. The new report, Over Heating: Financial Risks from Water Constraints on Power Generation, analyses water-related risks facing thermal and hydroelectric power plants in India, Malaysia, the Philippines, Thailand and Vietnam. These plants require large amounts of water for cooling and generation. WRI mapped the water stress level across the region and the location of more than 150 existing and planned facilities of the largest power-generation companies in the region. The analysis found that water shortages pose the highest risk for power generation companies in India. "Water-related risks are hard to quantify, yet they present a growing risk to power generation," said Piet Klop, acting director of WRI's Markets and Enterprise Program. "The next step is to take our analysis to specific companies and their exposure and response to those risks. On the upside, investors have investment opportunities that can come from better understanding water related risks." In India, approximately 62 per cent of existing and 79 per cent of planned thermal and hydroelectric power plants of the three largest power generation companies (NTPC, Tata Power, and Reliance Infrastructure) are located in water scarce or stressed areas. The country's water demand is expected to outgrow supply by 50 per cent by 2030 and estimates by the World Bank indicate that all available water supplies will be exhausted by 2050. "The power sector investors and analysts are making long-term bets on water that, in the future, might no longer be reliable," said Amanda Sauer, a senior associate at WRI. "They need to start assessing their exposure to water-related risks when considering long-term investment strategies." The report's findings suggest that project delays due to water permitting problems and general shortages may be costly. As part of the study, HSBC's analysts found that a	**15**	**CO4**

	12-month delay in commercial operation could lower the rate of return on investment by 1.5 per cent. Furthermore, each 5 per cent drop in power production due to water shortages could result in nearly a 0.75 per cent drop in the project's rate of return. "The projected expansion of power generation – whether coal, hydro or gas – is exposed to growing water stress," said Nick Robins, head of the Climate Change Centre of Excellence (C3E) at HSBC. Roshan Padamadan, a HSBC analyst at the Centre said, "Investors need to understand how companies are managing these risks, including the specific steps to optimize water use at the plant level." Over heating is the second report in a three-part series. The first report, Weeding Risk, looks at climate change and water scarcity impacts on the food and beverage sector in India, Indonesia, Malaysia, the Philippines, Thailand, and Vietnam. The third report, Surveying Risk, Building Opportunity, assesses environmental risks to commercial real estate in the region. **Questions:** 1. Analyse the case and interpret it. (5 Marks) 2. Write down the case facts. (5 Marks) 3. Write down an effective executive summary of given case. (5 Marks)		
	The End		

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Course code: PIPM8007 **Max. Marks: 100**
Instructions:

SECTION A **(5 * 4 = 20 Marks)**

	Attempt All Questions	Marks	CO
Q 1	Conceptually explain the salient features of Municipal Solid Waste (M.S.W.) Rules-2016.	4	CO1
Q2	Analyze, Explain and Describe salient features of the Uttarakhand Fire & Emergency Service, Fire prevention, and Fire Safety Act 2016.	4	CO1
Q3	Recommend Appropriate measures to prevent Occupational and Work Related Illness.	4	CO1
Q4	Conceptually explain the ISO 9001 and ISO 14001 in brief in meeting the requirement of the Organization objectives.	4	CO1
Q5	Analyze and Explain Common Hazards in the work place and their effects to the worker's health.	4	CO2

SECTION B **(4 * 5 = 20 Marks)**

	Attempt All Questions		
Q6	Analyze the Health Safety Environment (H.S.E) policy of an Electricity power company.	5	CO2
Q7	Analyze the effect of Electricity current on human body, resistance of human body and safe electricity current limits in case of a electric shock.	5	CO2
Q8	Analyze the management of hazardous waste including nuclear hazardous	5	CO2
Q9	Analyze the elements of a major emergency disaster plan	5	CO3

SECTION-C **(3 * 10 = 30 Marks)**

	Attempt Any three Questions		
Q10	Integrate and Analyze additional electrical safety requirements for Gas Insulated Substation (G.I.S) and Mines.	10	CO3
Q11	Integrate and Analyze minimum contents of Safety manual for Construction of Electricity plants and Electrical lines.	10	CO3
Q12	Analyze additional requirements of safety to Hydro electricity generation plants.	10	CO3
Q13	Integrate and Analyze of Site Emergency plants for Electrical plants and lines.	10	CO3

SECTION-D **(1 * 10 + 1 *20 = 30 Marks)**

	Attempt All Questions		
Q14	Apply, Analyze the guidelines for Occupational Health & Safety Management by I.L.O. (International Labor Organization)	**10**	**CO4**
Q15	Study the Case given below of "Response to Disaster Induced by Hoy Weather and Wild fires", And Answer the following questions. **Introduction** Climate change is expected to increase global temperatures and change rainfall patterns (Christensen et al., 2007). These climatic changes will increase the risk of temperature- and precipitation related extreme weather and climate events. The relative effects will vary by regions and localities. In general, an increase in mean temperature, and a decrease in mean precipitation can contribute to increased fire risk (Flannigan et al., 2009). When in combination with severe droughts and heat waves, which are also expected to increase in many fire regions fires can become catastrophic (Bradstock et al., 2009). Wildfires occur in many regions of the world, and due to their extreme nature, authorities and the public in general are acquainted with such extreme situations, and plans have been enacted to mitigate them. However, at times, the nature of fire challenges these plans and disasters emerge. This case study uses the example from Victoria, Australia, in 2009. The goal is to present hot weather and wildland fire hazards and their effects and potential impacts, and to provide an overview of experience to learn to manage these extreme risks, as well as key lessons for the future. **Background** Wildfire risk occurs in many regions of the globe; however embodying this risk in a single and practical universal index is difficult. The relationships between weather and wildfires have been studied for many areas of the world; in some, weather is the dominant factor in ignitions, while in others, human activities are the major cause of ignition, but weather and environmental factors mainly determine the area burned (Bradstock et al., 2009). Wildfire behaviour is also modified by forest and land management and fire suppression (Allen et al., 2002; Noss et al., 2006). Wildfires do not burn at random in the landscape (Nunes et al., 2005), and occur at particular topographic locations or distances from towns or roads (Mouillot et al., 2003; Badia-Perpinyà and Pallares-Barbera, 2006; Syphard et al., 2009). The intensity and rate of spread of a wildfire is dependent on the amount, moisture content, and arrangement of fine dead fuel, the wind speed near the burning zone, and the terrain and slope where it is burning. Wildfire risk is a combination of all factors that affect the inception, spread, and difficulty of fire control and damage potential (Tolhurst, 2010). **Description of Events** An episode of extreme heat waves began in South Australia on 25 January 2009. Two days later they had become more widespread over southeast Australia. The exceptional heat wave was caused by a slow-moving high-pressure system that settled over the Tasman Sea, in combination with an intense tropical low located off the northwest Australian coast and a monsoon trough over northern Australia. This produced ideal conditions for hot tropical air to be directed over southeastern Australia (National Climate Centre, 2009).	**20**	**CO4**

In Melbourne the temperature was above 43°C for three consecutive days (28 to 30 January 2009), reaching a peak of 45.1°C on 30 January 2009. This was the second-highest temperature on record. The extremely high day and night temperatures combined to produce a record high daily mean temperature of 35.4°C on 30 January (Victorian Government, 2009). The 2008 winter season was characterized by below average precipitation across much of Victoria. While November and December 2008 experienced average and above average rainfall, respectively, in January and February the rainfall was substantially below average (Parliament of Victoria, 2010a). During the 12 years between 1998 and 2007, Victoria experienced warmer than average temperatures and a 14% decline in average rainfall (DSE, 2008a). In central Victoria the 12-year rainfall totals were approximately 10 to 20% below the 1961 to 1990 average (Australian Government, 2009).

This heat wave had a substantial impact on the health of Victorians, particularly the elderly (National Climate Centre, 2009; Parliament of Victoria, 2009). A 25% increase in total emergency cases and a 46% increase over the three hottest days were reported for the week of the heat wave. Emergency departments reported a 12% overall increase in presentations, with a greater proportion of acutely ill patients and a 37% increase in patients 75 years or older (Victorian Government, 2009). Attribution of mortality to a heat wave can be difficult, as deaths tend to occur from exacerbations of chronic medical conditions as well as direct heat-related illness; this is particularly so for the frail and elderly (Kovats and Hajat, 2008). However, excess mortality can provide a measure of the impact of a heat wave. With respect to total all-cause mortality, there were 374 excess deaths with a 62% increase in total all-cause mortality. The total number of deaths during the four days of the heat wave was 980, compared to a mean of 606 for the previous five years. Reported deaths in people 65 years and older more than doubled compared to the same period in 2008 (Victorian Government,2009).

On 7 February 2009, the temperatures spiked again. The Forest Fire Danger Index, which is calculated using variables such as temperature, precipitation, wind speed, and relative humidity (Hennessy et al., 2005), this time reached unprecedented levels, higher than the fire weather conditions experienced on Black Friday in 1939 and Ash Wednesday in 1983 (National Climate Centre, 2009) – the two previous worse fire disasters in Victoria. By the early afternoon of 7 February, wind speeds were reaching their peak, resulting in a power line breaking just outside the town of Kilmore, sparking a wildfire that would later generate extensive pyrocumulus cloud and become one of the largest, deadliest, and most intense firestorms ever experienced in Australia's history (Parliament of Victoria, 2010a). The majority of fire activity occurred between midday and midnight on 7 February, when wind speeds and temperature were at their highest and humidity at its lowest. A major wind change occurred late afternoon across the fire ground, turning the northeastern flank into a new wide fire front, catching many people by surprise. This was one of several hundred fires that started on this day, most of which were quickly controlled; however, a number went on to become major fires resulting in much loss of life. The worst 15 of these were examined in detail by the Victorian Bushfires Royal Commission (Parliament of Victoria, 2010a). A total of 173 people died as a result of

	the Black Saturday bushfires (Parliament of Victoria, 2010a). They also destroyed almost 430,000 ha of forests, crops, and pasture, and 61 businesses (Parliament of Victoria, 2009). The Victorian Bushfires Royal Commission conservatively values the cost of the 2009 fire at AUS$ 4.4 billion (Parliament of Victoria, 2010a). **Interventions** The Victorian Government had identified the requirement to respond to predicted heat events in the Sustainability Action Statement and Action Plan (released in 2006 and revised in January 2009), which committed to a Victorian Heat Wave Plan involving communities and local governments. As a part of this strategy, the Victorian Government has established the heat wave early warning system for metropolitan Melbourne and is undertaking similar work for regional Victoria. The government is also developing a toolkit to assist local councils in preparing for a heat wave response that could be integrated with existing local government public health and/or emergency management plans (Victorian Government, 2009). The 'Prepare, Stay and Defend, or Leave Early' (SDLE) approach instructs that residents decide well before a fire whether they will choose to leave when a fire threatens but is not yet in the area, or whether they will stay and actively defend their property during the fire. SDLE also requires residents to make appropriate preparations in advance for either staying or leaving. Prior to 7 February 2009, the Victorian State Government devoted unprecedented efforts and resources to informing the community regarding fire risks. The campaign clearly had benefits, but there were a number of weaknesses and failures with Victoria's information and warning systems (Bushfire CRC, 2009; Parliament of Victoria, 2010b). Another key focus during the wildfire season is protecting the reservoirs, especially the Upper Yarra and Thomson catchments that provide the majority of Melbourne's water supply (Melbourne Water, 2009a). During the February 2009 fires, billions of litres of water were moved from affected reservoirs to other safe reservoirs to protect Melbourne's drinking water from contamination with ash and debris (Melbourne Water, 2009b). The Victorian Bushfires Royal Commission made wide-ranging recommendations about the way fire is managed in Victoria. These have included proposals to replace all single-wire power lines in Victoria, and new building regulations for bushfire-prone areas (Parliament of Victoria, 2010c). **Outcomes/Consequences** Following the findings from the various inquiries into the 2009 Victorian Bushfires, which found failings in assumptions, policies, and implementation, a number of far-reaching recommendations were developed (Parliament of Victoria, 2010c). National responses have been adopted through the National Emergency Management Committee, including: (i) revised bushfire safety policies to enhance the roles of warning and personal responsibility; (ii) increased fuel reduction burning on public lands; (iii) community refuges established in high-risk areas; (iv) improved coordination and communication between fire organizations; (v) modifying the 'Prepare, stay and defend, or leave early' approach (now 'Prepare, act, survive') to		

	recognize the need for voluntary evacuations on extreme fire days; and (vi) further ongoing investment in bushfire research, including a national research centre. **Lessons Identified** Australia has recognized the need for strengthening risk management capacities through measures including: (i) prior public campaigns for risk awareness; (ii) enhanced information and warning systems; (iii) translation of messages of awareness and preparedness into universal action; (iv) sharing responsibility between government and the people; (v) development of integrated plans; and (vi) greater investment in risk mitigation and adaptation actions. Predicted changes in future climate will only exacerbate the impact of other factors through increased likelihood of extreme fire danger days (Hennessy et al., 2005). We are already seeing the impact of many factors on wildfires and heat waves, for example, demographic and land use changes. In the future, a better understanding of the interplay of all the causal factors is required. The Victorian Bushfires Royal Commission stated "It would be a mistake to treat Black Saturday as a 'one off' event. With populations at the rural-urban interface growing and the impact of climate change, the risks associated with bushfire are likely to increase" (Parliament of Victoria, 2010c). **Questions:** 1. Analyse the case and interpret it. (5 Marks) 2. Write down the case facts. (5 Marks) 3. Write down an effective executive summary of given case. (10 Marks)		
	The End		