



Name:

Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, May 2022

Course: Aviation Security and Safety Management

Program: MBA AVM

Course Code: TRAV 7003

Semester: IV

Time : 03 hrs.

Max. Marks: 100

Instructions:

**SECTION A
10Qx2M=20Marks**

S. No.		Marks	CO
Q 1	What do you understand by the “Cyber Security” in relation of the Aviation operations and commercial activities?	2	CO1
Q 2	Differentiate between “Warning” & “Caution” alerts and “Advisory” alert awareness to flight crew, based on the human senses.	2	CO1
Q 3	List the Annexes that contains only International Standards and no Recommended Practices.	2	CO1
Q 4	Briefly describe the term “Hazard” in the context of Aviation safety.	2	CO1
Q 5	Briefly describe the “Safety Management System (SMS)” in the context of Aviation safety.	2	CO1
Q 6	What do you understand with “Mean Time Between Failure” (MTBF) and how it is related to “Failure Rate” of a component?	2	CO1
Q 7	Describe the key role of Aircraft Accident Investigation Board (AAIB) in relation of Indian Aviation Industry.	2	CO1
Q 8	Define the principal objective of rescue and firefighting services at aerodrome, as laid down in ICAO Annexure 14.	2	CO1
Q 9	Differentiate between level 1 and level 2 findings of a safety audit report.	2	CO1
Q 10	In Aviation Security threats environment, briefly describe MANPADS”.	2	CO1

**SECTION B
4Qx5M= 20 Marks**

Q 11	Examine the eight areas of airline operational safety, which are, subjected to IATA Operational Safety Audit (IOSA) standards.	5	CO2
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Q 12	Compare “Aviation Safety” and “Aviation Security”.	5	CO2
Q 13	Describe THREE methodologies of “Hazard” identification in Aviation eco system.	5	CO2
Q 14	Examine the FOUR key process elements of “Safety Risk Management”.	5	CO2

SECTION-C
3Qx10M=30 Marks

Q 15	<p>Discuss the “Organizational Factors” contributed to the ABC Express accident, in the case details given below.</p> <p>Case Details:</p> <p>ABC Express Airlines Beechcraft xxx crashed on approach to an Metropolitan Airport. The accident occurred on the second leg of the scheduled sequence of operation. The aircraft was destroyed by impact and subsequent fire. There were three fatalities, including the captain, and three serious injuries resulting from this accident. This accident occurred on the first day of duty for both members of the flight crew in the airline’s new southern routes. This was only the third operational day for the airline in this route structure. This was the captain’s first duty day with the airline and his first job as an airline pilot. The first officer had been flying with the company for only 1 month. The crew had never flown together prior to this day, and neither had flown the assigned flight route. Flight 861 was on an instrument flight rules (IFR) flight plan. Nearing arrival, the crew lost awareness of the aircraft’s position. Both pilots erroneously believed they were to the south of the airport, when in fact they were north of the airport. They also believed that air traffic control (ATC) was providing the flight with radar services, but in fact ATC was not. The flight’s radar services had been terminated earlier, a message that was noted on the flight’s voice recorder, but was not validated by the crew, which may mean they did not hear it. Also, the flight was operating in a nonradar-controlled environment, which means ATC could not “see” what the disposition of the aircraft was on its radar scope.</p> <p>The crew began what they believed was the approach into Anniston Metropolitan Airport from an excessively high altitude, at a high airspeed, without performing the required procedure of flying outbound with a procedure turn back toward the airport specified on the published</p>	10	CO3
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instrument approach chart. The crew also did not brief the procedure before commencing it. In addition to this, there was only one approach plate available for the crew, which was in use by the first officer, who was not the flying pilot. As a result of this, the captain, through inexperience and disorientation, became overly reliant on the first officer, who was providing incorrect information. After a series of maneuvers in which the crew called their position into question numerous times, the crew turned the airplane to the north to execute what they believed was the approach to Runway 5. Instead, they intercepted the back course localizer signal, and followed this away from the airport until the aircraft impacted terrain. A localizer is a signal that radiates outward from the approach end of the runway, along the virtual extended centerline of the runway. A back course localizer is a by-product of this signal that radiates in the reverse direction. This can also be used for an instrument approach, but the approach is run backward, meaning that, contrary to a normal approach, right is left, and left is right on the instruments.

The captain, a former military helicopter pilot, had been working as a general aviation flight instructor until he was hired by ABC Express. The captain received his initial training from Flight Safety International (FSI) in January 1992, which placed him on a list of qualified candidates awaiting airline interviews. Due to his qualifications, he was hired as a captain by ABC Express on May 31, 1992, contrary to their usual practice of hiring only first officers and moving senior first officers to the rank of captain. During his training with FSI, he had been specifically reprimanded for not listening to or using the first officer as a resource. This, along with high workload factors, inexperience in position, and lack of an approach plate, may have led the captain to become overly reliant on the first officer, thus all but changing roles with him. His first scheduled flight was to have been June 9, with the regional chief pilot acting as the first officer. However, due to maintenance problems and the shuffling of resources, it was decided collectively between the regional chief pilot, the crew scheduler, and the president of GP Express to have the captain fly on June 8 without the benefit of the chief pilot. No one asked the new captain how he felt about this, and he did indeed have reservations about the flight, but felt pressure to take this trip.

	<p>ABC Express hired the first officer in August 1991 after he successfully completed 50 hr of ABC Express ground training. He was furloughed shortly thereafter until April 30, 1992. After he returned to active duty, all of the first officer's flights were conducted on the airline's midwest routes. The first officer was scheduled to have flown the flights on June 8 with the regional chief pilot acting as captain. Due to the aforementioned resource shuffling, the first officer was paired with the accident captain on the June 8 flights. The night before the flight, the captain phoned the first officer to discuss his concern about the assignment because both were new to the southern operation.</p> <p>ABC Express had grown from a small, on-demand charter operation into a larger scheduled operation with routes across the midwest. The company's top management involved a mixture of varied experience, including the founder and CEO, a newly hired president, a director of operations with extensive experience in major air carrier operations, and a chief pilot with extensive experience in the airline's midwest operations. The Department of Transportation (DOT) awarded ABC Express an Essential Air Service (EAS) contract to increase their route structure on March 26, 1992. They began servicing their new routes in the south on June 6, 1992. The director of operations had originally proposed to supply each pilot with a set of approach charts and 5 days for route familiarization and qualification experience prior to starting service in the southern region. This was rejected by the CEO and then president of ABC Express as unnecessary, stating, "When pilots fly a charter, they do not perform a dry run," and that experience on their existing routes provided sufficient line operations experience.</p>		
Q 16	<p>Examine the evolution of safety in Aviation on following parameters:</p> <ul style="list-style-type: none"> (a) Technical (b) Human Factor (c) Organizational 	10	CO3
Q 17	<p>Attempt only one question (either 'A' or 'B').</p> <p style="text-align: center;">A</p>	10	CO3

	<p>Analyze the functioning of Directorate General of Civil Aviation (DGCA), in relation of Indian Aviation industry, on following parameters.</p> <p>(a) Role (b) Organizational set up (c) Interaction/communication with other stakeholders (d) Interaction with ICAO</p> <p style="text-align: center;">OR</p> <p style="text-align: center;">B</p> <p>Analyze the functioning of Bureau of Civil Aviation Directorate General of Civil Aviation (DGCA), in relation of Indian Aviation industry, on following parameters.</p> <p>(a) Role (b) Organizational set up (c) Interaction/communication with other stakeholder including CISF (d) Interaction with ICAO</p>		
SECTION-D 2Qx15M= 30 Marks			
Q 18	<p>Examine the major security threats to the Aviation operations and describe the cyber security threat on following parameters:</p> <p>(a) How cyber-attack generally identified? (b) Describe an example of cyber-attack where Airlines suffered badly on revenue and reputation.</p>	15	CO4

	(c) What precaution can be observed by the aviation industry stakeholders against cyber-attacks?		
Q 19	<p>Attempt only one question (either ‘A’ or ‘B’)</p> <p style="text-align: center;">A</p> <p>Keeping in view of the Reliability and Human factors aspects, answer the following, in reference to the case given below:</p> <p>Q1: Offer your comments on the reliability of wind screen?</p> <p>Q2: List out contributory human factors which were directly or indirectly related to the occurrence?</p> <p>Q3: Categorize the occurrence (Accident/ Incident) and justify your stand?</p> <p>Q4: As a Maintenance Head of the BA, what corrective actions you would like to suggest?</p> <p>Case Details</p> <p>The occurrence took place during a scheduled flight (BA 5390) from Birmingham to Malaga, Spain. With 81 passengers, four cabin crew and two flight crew the aircraft took off from Birmingham International Airport at 0720 hrs. Flight was cleared for a climb to FL230. The co-pilot had been the handling pilot during the take-off and, once established in the climb, the commander was handling the aircraft in accordance with the operator's normal operating procedures. At this stage both pilots had released their shoulder harness, using the release bar on the buckle, and the commander had loosened his lap-strap.</p> <p>At 0733 hrs as the cabin staff prepared to serve a meal and drinks, and, as the aircraft was climbing through about 17,300 feet pressure altitude,</p>	15	CO4

there was a loud bang and the fuselage filled with condensation mist. It was at once apparent to the cabin crew that an explosive decompression had occurred. The commander had been partially sucked out of his windscreen aperture and the flight deck door had been blown onto the flight deck where it lay across the radio and navigation console. The No 3 steward, who had been working on the cabin side of the door, rushed onto the flight deck and grasped the commander round his waist to hold on to him. The purser meanwhile removed the debris of the door and stowed it in the forward toilet. The other two cabin staff instructed the passengers to fasten their seat belts, reassured them and took up their emergency positions

The co-pilot immediately attempted to control the aircraft and, once he had regained control, initiated a rapid descent to FL110. The co-pilot manoeuvred the aircraft onto a visual final approach to runway 02 and completed a successful landing and stop on the runway at 0755 hrs. The engines were shutdown but the Auxiliary Power Unit, which the co-pilot had started up during the descent, was left running to provide electrical power to certain aircraft systems. As soon as the aircraft came to a halt, passengers were disembarked from the front and rear airstairs while the airport and local fire services recovered the commander back into the aircraft from his position half out of the windscreen frame, where he had remained throughout the descent and landing. He was taken to Southampton General Hospital suffering from bone fractures in his right arm and wrist, a broken left thumb, bruising, frostbite and shock. The other crew members and passengers were medically examined but apart from one steward who had cuts and bruising to his arm there were no other injuries.

Key findings of an Investigation:

The left windscreen had been changed during the night shift of the 8/9th June 1990 and the accident flight was the first since that installation. Eighty of the bolts which had attached the old windscreen were recovered from the work area during the investigation. The windscreen, been

primarily attached by bolts which were 0.1 of an inch shorter than those specified.

The person who fitted the windscreen was a Shift Maintenance Manager holding authorisations on BAC One-Eleven, Boeing 737, Boeing 757, HS 748 and with transit authorisations on L-1011 Tristar, Boeing 747 and a CAA licence holder for airframe and engines on the Viscount. His experience included 10 years in the RAF, followed by 23 years with British Airways. He appeared to be a mature, dedicated engineer who was well respected by flight crew and engineers alike.

Friday/Saturday night shift during which the windscreen was fitted was his first night work for approximately five weeks. He had been in a "day cycle" for five weeks and for his first night shift he only had 1-1/2 hours sleep.

OR

B

Keeping in view of the Safety and Risk Management systems, answer the following, in reference to the case details given below:

Q1: Identify hazard (s) in the abovementioned case?

Q2: Elaborate risk (s) involved the hazard (s)?

Q3: Based on your understanding, categorize risk (s) in terms of probability and severity?

Q4: What are your recommendations for the risk management in the abovementioned case?

Case Details

A well-designed aircraft with a history of reliable service is being prepared for a charter flight. Employees tow the aircraft from the hangar to the terminal. One employee sees wetness on the right tire as he unhooks the

tow bar. However, he does not give it attention, as he is very busy and has three other aircraft to move in the next 15 minutes. At the same time, a safety inspector is walking through the hangar when she encounters a hydraulic oil spill on the hangar floor. She notifies a janitor to clean up the slip hazard as she leaves. While cleaning the spill, the janitor wonders aloud where the spill came from. Afterwards, both the inspector and the janitor continue with their respective jobs. Meanwhile, the Chief Pilot assigns the charter flight to a new pilot with the company. While new to the company, the pilot is well trained and prepared for the flight. He is also eager to do a good job and to impress the chief pilot. The chief tells him that the passengers and the aircraft are waiting at the terminal, and the new pilot has to get over there right away to keep the clients happy and on schedule.

The flight requires a little more fuel, so a fuel truck is called. While the aircraft is being filled, the fueler notices a small puddle of reddish fluid under the right main landing gear. He sees the pilot walking out to the aircraft, but before he can say anything, his supervisor calls and tells him to get right over to another aircraft. Recently, the fueler was criticized by his supervisor for taking too long to finish his work, so he quickly jumps in his truck and drives off to the next job without saying anything to the pilot.

The pilot, wanting to make a good impression on his passengers and the chief pilot, personally escorts them to the aircraft and begins his preparation for the flight. One passenger asks him a brief question as he is on the right side of the aircraft. In a moment of distraction, he does not bend down to inspect the right-hand main landing gear. During taxi, the pilot feels the aircraft is taking the bumps a little hard but continues to the runway for take-off. Meanwhile, up in the tower, an air traffic controller, who happens to like this particular model of aircraft, picks up her binoculars to take a look at the taxiing aircraft. She notices a "wet spot" on the right main tire and radios the pilot. The pilot tells the controller that he probably ran over a puddle and asks for his clearance.

At the destination airport, the pilot executes a perfect landing and applies the brakes. The leaking hydraulic fluid heats up and ignites. The right main landing gear is engulfed in flames. The controller notifies the pilot and then

calls the crash fire rescue squad. The pilot calmly and proficiently manages the situation, successfully evacuating everyone from the aircraft without injury. The pilot and passengers watch from a safe distance while a perfectly good aircraft burns to the ground. "How could this have happened?" wonders the pilot.

Soon afterwards, the pilot is fired for failure to perform an adequate preflight inspection. Six months later, an aircraft is being towed out of a hanger. One of the employees sees wetness on the left main landing gear tire as he unhooks the tow bar.....and it continues.....until?