



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2018/2019**

COURSE NAME : ENVIRONMENTAL IMPACT OF AVIATION
COURSE CODE : BDL 30402
PROGRAMME : BDC
EXAMINATION DATE : DECEMBER 2018/ JANUARY 2019
DURATION : 2 HOURS
INSTRUCTION : ANSWER **FOUR (4)** QUESTIONS ONLY

Perkembangan dan kemajuan teknologi telah membawa kepada perubahan yang signifikan dalam kehidupan manusia. Oleh itu, kita perlu memahami impak teknologi terhadap alam sekitar dan masyarakat. Dengan memahami impak teknologi, kita dapat membuat keputusan yang bijak dalam menggunakan teknologi.

THIS QUESTION PAPER CONSISTS OF FOUR (4) PAGES

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- Q1**
- (a) Among the reasons of arising environmental issues are due to population growth, energy consumption, depleting of resource, and vulnerable ecosystem. Choose two of the reasons and discuss the impact of these reasons on the environment. (5 marks)
- (b) Carbon dioxide and water vapour are among the by-products of gas turbine combustion. Discuss the two briefly. (5 marks)
- (c) As an advisor to the Board of Directors of Civil Aviation Authority Malaysia, you are asked to suggest improvements on air traffic management and airport infrastructure in order to aviation emissions. Prepare at least three suggestions each. (12 marks)
- (d) In addition to the task given in **Q1(c)**, you are also asked to advice on the best approach to be used when implementing new standards to the local aviation industry. For this reason, outline at least two approaches to be used. (3 marks)
- Q2**
- (a) Explain the greenhouse effect on global warming. In addition to that, discuss the impact of global warming on precipitation and the effect of precipitation change on the people and environment. (10 marks)
- (b) The International Air Transport Association has introduced its four-pillar strategy to battle climate change. Among the strategies include adopting effective economic instrument. As a person in charge to implement this strategy in Malaysia, explain to the public the meaning of the said strategy and propose at least four initiatives that will be implemented. (5 marks)
- (c) As an aviation research consultant, you are asked by both the engine and airframe manufacturers to give several suggestions that can help improve the engine and airframe technologies. The improvement sought by both the manufacturers is aimed to reduce their impact on environment. For this reason, outline at least five suggestions for each of the manufacturer. (10 marks)
- Q3**
- (a) Define noise frequency and amplitude. List the three sources of aircraft noises. (4 marks)
- (b) Among the effects of aviation noise to property and communities include structural damage, sleep disturbance, and annoyance. Describe these three effects. (6 marks)

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(c) You have been appointed as an Environmental Manager in Kuala Lumpur International Airport. Recommend to the Board of Directors, the steps to be taken to assess the aviation noise within the airport.

(10 marks)

(a) Apart from the task given in Q3(c), you are also asked to strategize the land-use plan and management at the vicinity around the airport. For this reason, propose at least five recommendations to the Board of Directors.

(5 marks)

Q4 Table Q4 provides the emission data for Trent XWB-84 and General GENx-2B67/P engines.

Table Q4: Engine emission data

LTO Cycle	Measurement Component	Engine	
		Trent XWB-84	GENx-2B67/P
Take Off	Fuel Flow (kg/s)	2.819	2.453
	HC (g/kg)	0	0.02
	CO (g/kg)	0.39	0.07
	NOx (g/kg)	45.24	34.21
Climb	Fuel Flow (kg/s)	2.306	2.009
	HC (g/kg)	0	0.02
	CO (g/kg)	0.39	0.17
	NOx (g/kg)	34.2	21.1
Approach	Fuel Flow (kg/s)	0.801	0.642
	HC (g/kg)	0.01	0.04
	CO (g/kg)	1.18	1.78
	NOx (g/kg)	11.12	11.11
Idle	Fuel Flow (kg/s)	0.291	0.219
	HC (g/kg)	1.03	0.41
	CO (g/kg)	21.46	14.28
	NOx (g/kg)	4.41	4.92

Note: *LTO* : Landing, Take-off *HC* : Hydrocarbon *CO* : Carbon Monoxide
NOx : Oxides of Nitrogen

Based on the data given in the table:

(b) Calculate the amount of HC, CO and NOx produced for each component of the LTO cycle.

(19 marks)

(c) Determine for both engines the highest amount of emission for each LTO cycle.

(4 marks)

(d) Determine which engine generate the least emission.

(2 marks)



- Q5**
- (a) List four alternative jet fuels approved by American Society for Testing and Materials (ASTM). (4 marks)

 - (b) Discuss the reasons why the industry considers the business of aircraft end-of-life is lucrative. (6 marks)

 - (c) A local airline came to you for a consultation on dismantling their old aircrafts. State a list of action that the airline is required to take to dismantle their aircraft. The list should include brief descriptions explaining the action listed. (10 marks)

 - (d) Apart from **Q5(c)**, you are also asked for advice regarding challenges faced by the aviation industries in aircraft recycling and storage. Prepare an action plan that can be implemented by the local industries to reduce these challenges. (5 marks)

- END OF QUESTIONS -

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