



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

AERONAUTICAL ENGINEERING

TUTORIAL QUESTION BANK

Course Name	:	FLIGHT SCHEDULING AND OPERATIONS
Course Code	:	R15-A72121
Class	:	IV B. Tech I Semester
Branch	:	Aeronautical Engineering
Year	:	2018-2019
Course Coordinator	:	Ms. M. Snigdha, Assistant Professor, Dept. of AE
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OBJECTIVES

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited.

In line with this, Faculty of Institute of Aeronautical Engineering, Hyderabad has taken a lead in incorporating philosophy of outcome based education in the process of problem solving and career development. So, all students of the institute should understand the depth and approach of course to be taught through this question bank, which will enhance learner's learning process.

S.No	Questions	Blooms Taxonomy level	Course Outcomes
UNIT - I			
NETWORK FLOWS AND INTEGER PROGRAMMING MODELS			
Part - A (Short Answer Questions)			
1	Define the term Complexity theory of airline planning?	Remember	3
2	Explain the different types of network flow model for airline operations?	Understand	2
3	Describe Transshipment Nodes for long and short route planning?	Understand	1
4	Define the term source and destination for network flow model?	Remember	2
5	What are directed flow and undirected flow for the role of network flow model?	Remember	3
6	Explain revenue management for flight scheduling and operations?	Understand	3
7	Define the term arc capacity for the role of network flow operation?	Understand	2
8	Describe demand and supply node for flight assigned operations?	Remember	1
9	Discuss integer programming models for set covering/ partitioning problems?	Remember	1
10	Explain traveling salesman problem using different methods of solution by simulation?	Understand	2
Part - B (Long Answer Questions)			
1	Describe the role of complexity of airline planning? Explain with an example?	Understand	2

2	What are the different types of network flow model in shortest path problem?	Remember	1
3	Discuss different types of network flow model in minimum cost flow problem?	Understand	1
4	Explain the different types of network flow model in maximum flow problem?	Remember	1
5	Discuss the different types of network flow model in multi-commodity problem?	Understand	2
6	Explain the integer programming models for set covering/partitioning problems?	Remember	3
7	Derive mathematical formulation for travelling salesman problem? Explain with an example?	Understand	3
8	Briefly explain the role of operations research and simulation in network flows and in integer programming models?	Remember	2
9	Derive mathematical formulation for integer programming models for set covering/partitioning problems?	Remember	1
10	Distinguish between travelling salesman problem and integer programming models for set covering/partitioning problems	Remember	1

Part - C (Problem Solving and Critical Thinking Questions)

1	Derive the mathematical expression for shortest path problem? Explain with example?	Remember	3
2	Calculate the mathematical expression for minimum cost flow problem? Explain with example?	Understand	3
3	Derive the mathematical expression for maximum cost flow problem? Explain with example?	Remember	1
4	Formulate the mathematical expression for multi-commodity problem? Explain with example?	Remember	3
5	Derive the mathematical expression for integer programming models for set covering/partitioning problems?	Remember	2
6	Obtain a mathematical expression for travelling salesman problem? Explain with an example?	Remember	3
7	Distinguish between minimum cost flow and maximum cost flow problem for flight operations?	Remember	3
8	Explain the mathematical formulation for the role of operations research and simulation in network flows and in integer programming models.	Remember	2
9	Illustrate the advantages and disadvantages of airline operations and scheduling?	Understand	4
10	Distinguish between maximum cost flow and multi-commodity problem for flight operations?	Understand	2

**UNIT - II
AIRCRAFT ROUTING & MANAGEMENT OF IRREGULAR
OPERATIONS**

Part – A (Short Answer Questions)

1	What are the different types of aircraft routing covering short distance?	Understand	1
2	Describe aircraft routing cycle for long distance covering?	Understand	2
3	Explain flight coverage for any commercial type of an aircraft?	Remember	2
4	Discuss the goal of aircraft routing which covers the longest route?	Remember	2
5	Define the term flight coverage which covers both domestic and international flight routes?	Remember	1
6	Explain time band approximation model for regular and irregular operations?	Remember	1
7	What are airline operations with different constraints, objective function, decision variables?	Remember	1
8	Define the term aircraft routing generators for short distance covering?	Understand	3
9	What is the maintenance required in aircraft regular operations?	Understand	1

10	Discuss the advantages of aircraft routing for short distances?	Understand	1
11	Define aircraft tail number assigned for different types of airlines?	Understand	1
12	What is maintenance required for routing cycles and routing generators?	Understand	1
Part - B (Long Answer Questions)			
1	Explain Routing cycles of a flight schedule? Explain with block diagram?	Understand	2
2	Briefly explain the different types of maintenance required in an aircraft?	Remember	1
3	Describe aircraft schedule recovery problem for airline regular operations?	Remember	1
4	Differentiate between aircraft routing cycles and aircraft routing generators?	Remember	3
5	Explain time-band approximation model to handle disruption in regular schedules?	Understand	2
6	Briefly explain the irregular operations in an aircraft? Explain with example?	Remember	3
7	Differentiate between airline regular operations and airline irregular operations?	Understand	2
8	Discuss disruption of schedule and recovery of an airline? Explain with example?	Understand	1
9	What are the advantages and disadvantages of airline irregular operations?	Remember	3
10	Explain aircraft schedule recovery problem for airline irregular operations? With example?	Understand	1
Part - C (Problem Solving and Critical Thinking)			
1	What are the different types of routing systems? Explain with block diagram?	Understand	3
2	Derive the mathematical expression for aircraft routing cycles? Explain With example?	Remember	3
3	Briefly explain the mathematical modeling of aircraft routing? Explain with example	Understand	3
4	Calculate the mathematical expression for aircraft routing generators? Explain with an example problem?	Remember	2
5	What are the maintenance requirements of aircraft routing covering long distance path?	Understand	2
6	Explain the maintenance requirements for aircraft regular operations? Explain with an example?	Remember	3
7	Obtain the mathematical expression for time band approximate model Problem? Explain with an example?	Understand	2
8	Derive the mathematical expression for routing generators? Explain With example?	Understand	3
9	Formulate the mathematical expression for aircraft routing? Explain with an example problem?	Remember	2
10	Distinguish between aircraft routing and routing generators? Explain with an example?	Remember	3
UNIT-III FLIGHT SCHEDULING			
Part - A (Short Answer Questions)			
1	Define the term flight scheduling for airline covering long distance route?	Understand	1
2	Discuss the types of route system of an airline operation system?	Understand	2
3	What is point-to-point flight for an airline?	Remember	3
4	Define the term airline hub for scheduling a flight?	Remember	1
5	Explain economic viability for flight scheduling?	Remember	1
6	Discuss the route development for flight scheduling process?	Remember	1
7	Explain flight scheduling using different types of objective function?	Understand	1
8	Define load factor for passengers for a commercial aircraft?	Understand	1

9	What is spoke which connects long and short route at distinct places?	Remember	2
10	Derive an expression for load factor of an airline?	Remember	3
11	What are the tactical developments for airline scheduling process?	Remember	1
12	Explain the strategic development for flight scheduling process?	Understand	1
13	Describe Long-Range Schedule Planning for flight operation process?	Understand	2
14	Explain different types of Long-Range Schedule Planning for airline operations?	Understand	2
15	List out the market evaluation for long and short route development schedule?	Understand	3
16	Explain Aircraft route network which connects two distinct places?	Remember	2
17	What are the different types of hubs and hangars where aircraft have been kept?	Remember	2
18	Describe the route development programme for long range aircraft?	Remember	1
19	Explain the route development programme for short range aircraft?	Remember	3
20	Draw a sketch of airline network with two hubs and nine spokes?	Remember	1
21	Discuss air carrier policies for strategic and tactical development?	Remember	3
22	What are the different phases of aircraft scheduling operation development?	Remember	1
23	Elaborate the full forms of ILS, GPS, VHF, VFR, IFR, DME and NDB	Remember	1
24	What are the schedule issues for an airline operation?	Remember	1
25	Define schedule optimization for an airline development operation?	Understand	2
26	Explain load factor for commercial and military cargo/ bomber aircraft?	Understand	1
27	Derive the expression for frequency to calculate the load factor for capacity of passengers?	Remember	3
28	Explain hierarchy for airline planning? Explain with neat sketch?	Remember	2
29	What are the schedule constructions for operational feasibility?	Understand	3
30	Explain flight scheduling for Boeing 777 aircraft?	Understand	1
31	Discuss maintenance issue for a commercial aircraft and military cargo/bomber aircraft?	Understand	1
32	Explain large hub for long distance connecting more than three way routing?	Understand	1
33	Define small hub for long distance connecting two way routing?	Remember	1
34	Discuss medium hub for long distance connecting three way routing route?	Remember	1
35	Explain active hub for larger aerodrome?	Remember	2
36	What are the different types of holding bays in an airport?	Remember	2
37	Distinguish between large hubs and active hubs?	Understand	2
38	Explain flight scheduling for delta airlines?	Understand	3
39	Discuss airline scheduling for domestic aerodromes?	Remember	1
40	Explain airline scheduling for international aerodromes?	Remember	2
41	Distinguish between medium hubs and active hubs?	Remember	3
42	What is maintenance viability for flight scheduling operations?	Remember	1
43	What are the different types of maintenance checks?	Remember	2
44	Discuss different types of runways? Explain with an example?	Remember	1
45	Distinguish between runway pavement and runway orientation?	Remember	3
46	Explain airside and landside for an aerodrome?	Remember	1
47	Define the term apron and airfield for an aerodrome?	Remember	2

48	Explain taxiways, apron gates and marker beacons?	Understand	1
Part – B (Long Answer Questions)			
1	Describe the different route systems of an airline? Explain with an example?	Remember	2
2	Explain load factor and frequency? Derive an expression for load factor?	Understand	3
3	Describe the different types of hub and spoke flight? Explain with an example?	Remember	1
4	Briefly Explain point-to-point flights for an airline? Explain with an example?	Understand	2
5	Describe the route system of an airline? Explain with block diagram?	Remember	3
6	What are the development processes for flight scheduling? Explain with block diagram?	Understand	4
7	Explain economic viability for an airline? Explain with an example?	Remember	2
8	Discuss the main larger distance route development? Explain with block diagram?	Understand	2
9	Describe the significance of flight scheduling? Explain with an example?	Remember	2
10	Briefly explain the basic layouts which represent the cockpit? Explain with an example?	Understand	2
Part – C (Problem Solving and Critical Thinking)			
1	Explain the lighting system which represents the runways? Explain with block diagram?	Remember	4
2	Distinguish between precision runway and non-precision runway? Explain with an example?	Remember	3
3	What are the flight scheduling processes for airbus 320? Explain with an example?	Remember	6
4	Distinguish between operational feasibility and economic viability?	Understand	7
5	Briefly Explain instrument landing system? explain with block diagram	Understand	2
6	What are the different types of route systems of an airline? Explain with an example?	Understand	2
7	Explain briefly about the different types of taxiways and holding bays? Explain with an example?	Understand	1
8	Describe the term hub and spoke flight? Explain with a neat sketch?	Understand	7
9	Briefly explain microwave landing system? Explain with a neat sketch?	Remember	7
10	What is the importance of communication, navigation and surveillance (CNS)?	Understand	8
UNIT-IV			
FLEET ASSIGNMENT & CREW AND MANPOWER SCHEDULING			
Part – A (Short Answer Questions)			
1	Discuss operating cost and recapture rate and passenger spill cost for fleet assignment?	Remember	1
2	What are the different types of fleet assigned for an aircraft?	Remember	1
3	Explain crew scheduling and crew pairing scheduling?	Remember	1
4	Define the maintenance checking process for fleet assignment?	Understand	1
5	What are the different types of fleet assignment?	Remember	1
6	Define the type of fleet assigned for arrival flight and departure flight?	Remember	1
7	Discuss time space network for fleet assignment?	Understand	1
8	Explain the different types of manpower scheduling?	Understand	1
9	What are the different types of baggage handling development?	Understand	1
10	Explain the maintenance checking process for crew pairing?	Understand	1

Part – B (Long Answer Questions)			
1	Explain the maintenance required for crew rostering? Explain with example?	Remember	2
2	Derive the mathematical model for fleet assignment problem? Explain with example?	Remember	3
3	Explain the different constraints used for development for fleet assignment?	Understand	2
4	Distinguish between crew pairing and crew rostering? Explain with example?	Understand	2
5	Explain the different constraints used for development for crew pairing. ? Explain with example	Remember	3
6	What is the maintenance required for crew generator? Explain with example?	Remember	2
7	Explain the different constraints used for development for crew rostering?	Understand	1
8	Calculate the mathematical model for crew rostering problem? Explain with example	Understand	2
9	Distinguish between crew generator and crew rostering? Explain with example	Understand	3
10	Explain the different constraints used for development for crew generator?	Understand	1
Part – C (Problem Solving and Critical Thinking)			
1	Explain the development process of fleet assignment using different network flows? Explain with example?	Remember	3
2	What are the different types of fleet assignment models? Explain with block diagram?	Understand	2
3	What are the development process of fleet diversity and fleet types? Explain with example?	Remember	3
4	Explain the significance of manpower scheduling? Explain with example?	Understand	3
5	Derive the mathematical expression for manpower scheduling. ? Explain with example	Understand	2
6	What are the development processes of crew rostering using different network flows? Explain with example?	Understand	3
7	Explain different constraints used for development for manpower scheduling?	Remember	1
8	Describe the development process of manpower scheduling using different network flows? Explain with example?	Understand	3
9	What are the stages of crew scheduling? Define crew pairing and describe using an example the mathematical model for crew pairing?	Remember	2
10	Explain the maintenance required for aircraft routing? Explain with example?	Understand	3
UNIT-V			
GATE ASSIGNMENT AND AIRCRAFT BOARDING STRATEGY			
Part - A (Short Answer Questions)			
1	Define level of handling? Explain with an example?	Understand	1
2	Discuss gate assignment? Explain with neat sketch?	Understand	1
3	Explain passenger flow handling? Explain with an example?	Understand	1
4	What are the common strategies used for aircraft boarding process?	Understand	1
5	Define aircraft boarding development process? Explain with an example?	Understand	1
6	Explain objective function for gate assignment? Explain with an example?	Remember	1
7	What are the parameters required for gate assignment? Explain with an example?	Remember	1
8	Explain the seating arrangement placed in an aircraft? Explain with an example?	Remember	1
9	Define the term window aisle, side aisle and interference aisle system?	Remember	1
10	Explain aircraft boarding handling system? Explain with an example?	Remember	1
Part - B (Long Answer Questions)			
1	What are the advantages and disadvantages of aircraft boarding strategy?	Understand	2

2	Derive the distance matrix of gate assignment? Explain with an example?	Understand	2
3	Describe some of the factors that impact the assignment of gates for arriving flights? Explain with example?	Understand	2
4	What are the different types of aircraft boarding strategy? Explain with example?	Remember	2
5	Explain back to front and window-middle-aisle boarding process?	Remember	2
6	Describe some of the factors that impact the assignment of gates for departure flights?	Remember	2
7	Explain window aisle interferences? Explain with an example?	Remember	2
8	What are the different types of interferences? Explain with the neat sketch?	Understand	2
9	Calculate the mathematical model for aircraft boarding process?	Understand	3
10	Explain side aisle interferences? Explain with a neat sketch?	Understand	3
Part – C (Problem Solving and Critical Thinking)			
1	Derive the mathematical expression for gate assignment problem? Explain with an example?	Remember	3
2	Calculate the mathematical expression for aircraft boarding process? Explain with an example?	Remember	3
3	What is the maintenance required for gate assignment? Explain with example?	Remember	3
4	Explain the different types of terminal gates? Explain with example?	Understand	3
5	Calculate the mathematical expression for distance matrix of gate assignment?	Understand	2
6	What is the maintenance required for ground handling process? Explain with example?	Understand	2
7	Describe the different levels of handling passenger flow? Explain with example?	Understand	2
8	Explain different types of baggage process for passengers traveling in airlines with an example?	Remember	3
9	What are the different types of checking process for passengers? Explain with example?	Remember	3
10	Briefly explain the different types of ground handling process? Explain with an example problem?	Remember	3

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